ORIGINS

The Journal of The Biblical Creation Society

No.25

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1998

The Great Horse Race
– a form guide

The Neanderthal Gentleman

Research in Germany

Adam & Eve at Work

£2·75

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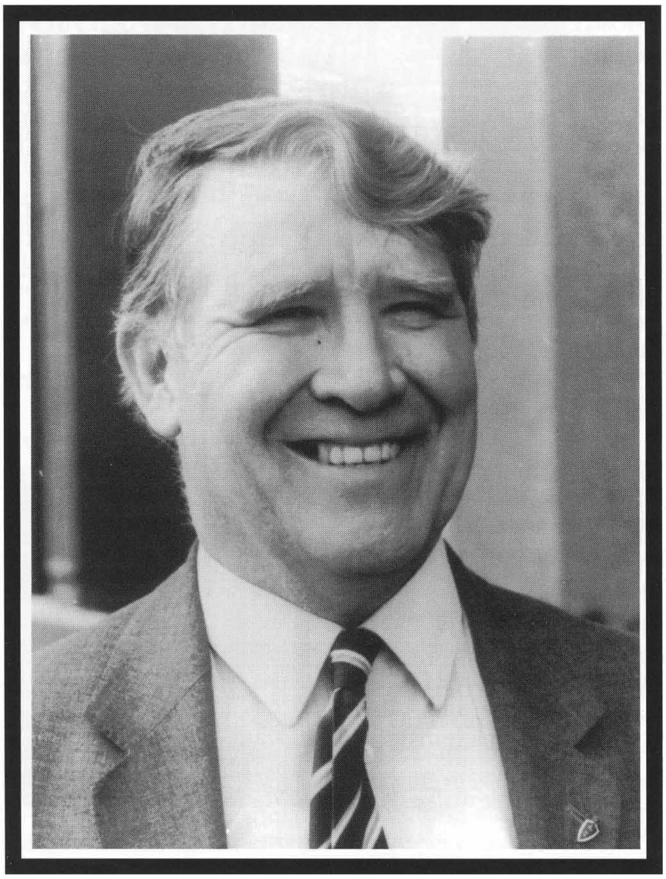
Editorial

A Tribute to Professor Verna Wright

THE *Biblical Creation Society* has 'lost' a good friend and vice-president in the passing of Professor Verna Wright. After two years of suffering with cancer, Verna Wright passed into the Lord's presence on 31st January 1998, aged 69 years. Verna was Professor of Rheumatology at the University of Leeds where he headed the Rheumatology and Rehabilitation Unit and was held in high regard. His main work was in the understanding of the nature of human joints. When he retired, he left behind a team of thirty researchers. He had over a thousand publications to his name.



But Professor Wright would wish to be remembered most for his Christian life. The Lord saved him through the ministry of the Bedford Young Life as he was about to enter Liverpool University to study Veterinary Surgery. In his own words of testimony, 'I quietly prayed, acknowledging my guilt, seeking the pardon that Christ had died to procure and owning Him as the risen Lord who would control my life.'

He was a man who loved the Word of God and it was the determining guide in his life. He always had time to serve the Lord and speak for Him. His greatest desire was to preach the gospel (he was a regular open air preacher in Leeds). So, with Lance Pibworth, he founded the United Beach Missions, served as President of the National Young Life Campaigners, was secretary to the Christian Medical Fellowship, vice president to the Lord's Day Observance Society and gave himself to the work of the creation ministries in the UK. He was president of the Creation Science Movement as well as being vice-president of our Society. His very presence in these organisations gave the lie to the claim by many that no professional, academic biologist could be a creationist!

In fact, his creationist principles often gave him an important stimulus in his research. For example, it was generally accepted that a part of the knee joint was vestigial—that is, a useless remnant from our animal ancestry—and was the cause of unnecessary pain in man. Appreciating the principle of man's specific and deliberate design by God, Prof. Wright realised this could not be true and set to work researching its function. This he succeeded in doing and, as a result, made a significant advance in this area of medicine. In fact, he and others have shown that there is no ideal animal model for the human knee; man is unique in several aspects.

Similarly, it has often been argued that our human back problems are the result of our bipedal structure, the spine having been designed for a quadruped. He vigorously disputed this, showing that quadrupeds also suffered back problems when their backs were misused and were no more protected in this way than man's.

When he discovered that he had cancer from which he would not recover, he is reported as commenting that this was an opportunity to prove what he had always believed and taught about the adequacy of the Lord in all circumstances. He continued to give himself wholeheartedly to his work and ministry as long as he was physically able. I had the privilege of sharing the platform with him some months after he had heard the news. That day had been spent participating in a major academic conference and yet he came and gave a splendid talk on creation *vs.* evolution. There was no trace of him holding back, though he must have been exhausted.

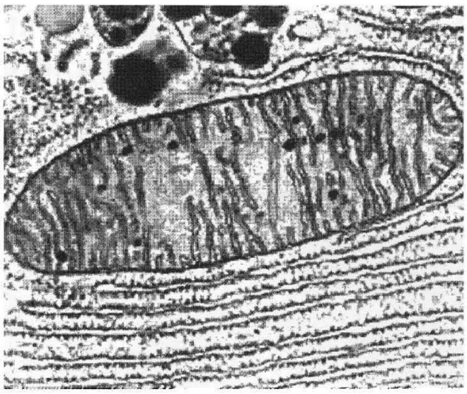
Verna Wright has left behind him a wife, five sons and four daughters. We extend our sympathy to them all. He has also left behind many spiritual children and a great legacy. We thank the Lord for this godly man.

J.H.J.P.

Creation in the News

The Mitochondrial Clock

EACH person's cells contain a structure known as the mitochondrion. This is the energy-producing part of the cell. It contains its own DNA material (DNA being the genetic master-plan). What is of particular interest is that this DNA is inherited from the mother only.



As a result, it is a good source of genetic finger-printing to discover the family ancestry of the creature.

This has been known for sometime. Like all natural processes, the replication of this material is subject to occasional copying errors. Most errors are eliminated by the built-in copying processes, but once in a while, the error is retained and passed on from generation to generation.

By studying the variations in the mtDNA, geneticists have proposed that the history of man can be reconstructed. This led to the proposal that all of mankind has descended from a single common female ancestor in Africa around 200,000 years ago. Inevitably she became known as the *African Eve!* In a parallel study of the Y chromosome (inherited through the male line only), others have deduced that there was a common male ancestor around the same time. The dating is based on estimated rates of mutation in the mtDNA.

This work has come under new scrutiny as a result of the studies in the Russian tsar, Nicholas II. The researchers were startled to find that the mutation rate in that family was significantly higher than that previously assumed. In fact, using this new rate, the African Eve would have lived a mere 6,000 years ago!

It should be noted that the various teams of workers studying this data, and that in other communities, believe that there must be some other factor giving this unusual (?) rate of mutation. There is bound to be a lot more work published in this area and we will keep our readers informed.

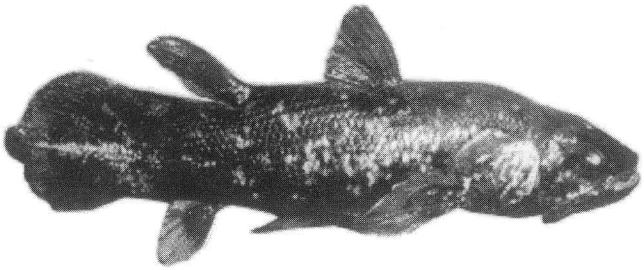
The Cœlacanth Again!

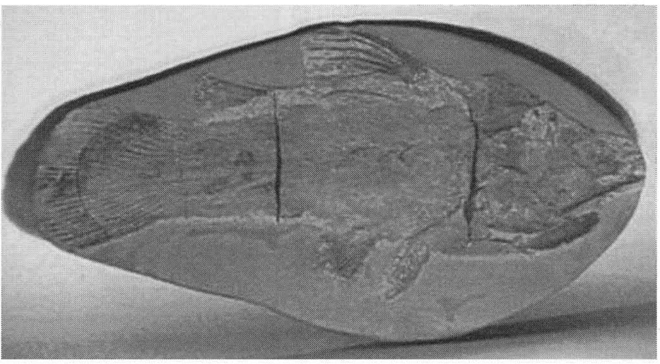
ONE of the interesting stories of the hunt for an alternative explanation to the origin of life to the biblical account has been the search for the transitional fórms. Their stark absence has led to them being called *missing links*.

A classic example has been the proposed transition between the fish and the reptiles. It was formerly believed that the *cœlacanth* was the transition form, its fossil *(right)* record disappearing about 70 million years ago. This would have been about the right time for such a transition form.

Various myths grew from this, such as that it walked on the ocean floor bed and that it was ugly.

This theory came unstuck when it was discovered alive and well in 1938 off the coast of southern Africa *(below)*.





Since then it has been shown to be part of a fairly extensive colony of the fish which are at risk of becoming extinct in the next couple of decades because of modern pollution!

Of course, it was found to be a true fish, with beautiful and graceful movements. It has not changed in any significant way in the supposed 70 million years. Extinction in the fish record, of course, does not mean extinction in the total environment.

But news has now broken of a new discovery. The fish is on sale, thousands of miles away, in the fish market at Manado, Indonesia! The local fisherman know it well. It grows up to five feet in length. They have been catching it and eating it for years and the scientific world did not know!

Continued on page 9

Adam and Eve at Work

The Relevance of the Doctrine of Creation to the World of Work

Michael Matthews

'When Adam delved and Eve span
Who then was the gentleman?'

WHATEVER this old rhyme tells us about the class struggle and feminism, it does enshrine an important truth: Adam and Eve worked! Of course the nature of work changed after the Fall, but they were nevertheless created to work. This is one of the major doctrines that we learn from the Scriptures, that God put man on the earth to work in it (Genesis 1:26).

It is not difficult to see, therefore, that given the Bible account, Creation has a direct relevance to the principle of work. But sometimes it can be difficult to see how Creation is relevant to the world of work in our day, in the office and the factory, with all its high technology, other than to concede the principle that we ought to work!

The Importance of Genesis

But does it really matter what we believe about the first chapters of Genesis? Many today think that science has proved we all evolved anyway, and that it is therefore pointless to continue fighting this particular battle. If we wish to hold on to our belief in Creation, even six-day creation, so be it, but how is that relevant to much of our everyday lives? The reason is that our underlying beliefs affect how we act, and this is just as true in the world of work as any other part of our lives. Many of today's attitudes and practices in the world of employment stem from a set of evolutionary beliefs which is completely at odds with biblical teaching, which produces a quite different set of attitudes.

We must begin at the beginning. First things first: we take God at His word. We start from the premise that the Bible is true ('Your word is truth,' John 17:17), and therefore that everything He has said in His Word is true, is morally right, and factually correct. The *Biblical Creation Society* has sought to expose the incompatibility between the Bible's teaching concerning all aspects of Creation and evolution: this is one of the aims of the *Creation Manifesto*. Genesis (which means 'the beginnings') contains the foundation for every major doctrine of Scripture and that includes the doctrine of work, in all its aspects.

The Practical Implications of Evolution

So then, if it is true that our beliefs in the matter of Creation influence our actions, how does it work out in practical terms? What practical differences does it make? Let us contrast some of the natural and logical—and supposed—consequences of each set of beliefs. Firstly, what are the consequences of evolutionary thinking? I must stress that I have throughout assumed that evolution is atheistic: it is my view that the *Creation Manifesto* shows that belief in evolution is incompatible with belief in the God who reveals himself in Scripture.

We do not realise how much evolutionary thinking reaches into every part of our lives, including work.

Since the world has no purpose, it is merely an 'accident': the same therefore applies to man, he has no purpose to fulfil in being here. Why then work if we can avoid it? We may as well make our meaningless, purposeless existence here as easy and comfortable as possible: 'eat, drink and be merry, for tomorrow we die.' If we cannot avoid work, then we get by with doing as little as we can, and the quality is irrelevant—for what use is it putting effort into that which is unseen and will not last?

Unfortunately, however, for most people work is a necessary evil. The still widely accepted mechanism for evolution is the survival of the fittest. The motive for work, therefore, as for everything, is 'survival.' We have to work to survive, as individuals, and as a race. But this implies a 'conflict' situation, and often those marked for promotion at work are those who show the necessary 'killer instinct.'

An essential consequence of evolution is that man is seen as just another animal, with no essential difference. The results of experiments on animals are therefore applied to humans, and this applies in the world of work as elsewhere. These include many experiments on social interaction, including the effects of overcrowding, isolation, *etc.*, and the results are behind a number of human resourcing policies at work. Quite apart from the question as to whether the behaviour of rats can indicate the behaviour of humans, it assumes that there is no qualitative difference—man has no 'soul.'

Value and ethical judgments cannot be brought to bear in employment, as all are free to choose their lifestyle, not being answerable to a creator. Thus 'sexual orientation' is not a matter for discrimination, and employers treat marriage no differently to co-habitation: and soon it is likely this will apply to homosexual 'partners' also. Thus all those living together with a sexual relationship will enjoy the same rights as married couples.

As evolution is continually progressing, 'nature' has not yet 'got it right'—indeed there is no 'right' to get, as evolution has no direction and no purpose. We are, therefore, free to experiment with man, in his environment. But we are also free to experiment with genetic material, in the hope that we might improve on the arbitrary arrangements that have evolved so far. In the food retailing industry, this applies to our food as well (but this does not imply that genetic modification is always wrong).

Within the context of evolution, there are no set patterns of work, as everything is changing, and work itself is merely a product of evolution. Often we hear the phrase that 'patterns of work are evolving': which often means that people are being forced to work unsocial hours and days by commercial pressures.

Evolutionary thought can penetrate to the most unexpected areas. Within retailing and engineering, as well as other industries, some computer programs use so-called 'genetic algorithms', which are based on supposed evolutionary mechanisms.

In summary, this set of beliefs can easily lead to an impersonal, competitive, dog-eat-dog environment at work, and the all too prevalent idea that work is to be avoided if at all possible. Organisational and selection policies, for employment and promotion, can depend heavily on attitudes formed by evolutionary theories and psychology.

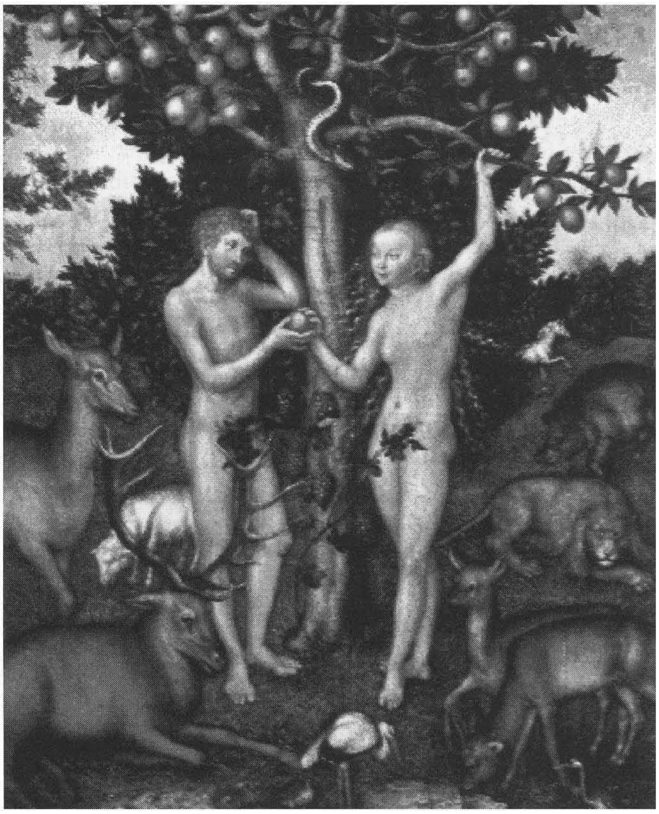
The Practical Implications of Creation

By contrast, when we turn to Creation as revealed in the Scriptures, it gives us a totally different view of man and his work.

Genesis teaches us that man was created perfect: man is included in the description of Creation as 'very good' and as this was before the Fall we know that man was morally as well as physically unblemished. We are most decidedly not 'an experiment,' nor a stage in evolutionary progression. Rather than 'progressing' (an odd term if evolution is going nowhere), man is 'regressing.' There is a tendency in evolutionary terms to view all change as good, whereas with a Creation perspective we can make objective evaluations of changes.

This doctrine also introduces the concept of 'good' and 'evil.' Moral choices are, therefore, possible. By definition, as we said, evolution has no 'right' or 'wrong' and all are free to choose their own set of values. The fact that in many cases it is now illegal to discriminate on such moral grounds shows the degree to which evolutionary ideas have seeped into the national consciousness.

Man is a spiritual being, created 'in God's image': he therefore has a purpose in life, which is not mere survival, but to have fellowship with God. He has a purpose in living, which is communion with God, and a goal at the end of that life, which is to be with him and live with him for ever. So his aim is no longer to serve himself, believing that 'if you don't trample on him, he'll trample on you,' but to serve God, and serve others for His sake.



We are not free to treat men and women as just a 'higher animal,' and experiment with them: we are dealing with souls precious in the sight of God, and employment practices should be framed with this in mind. An obvious application is the need to rest one day in seven, and to be free to worship with others on a day set aside.

Man was created to work, which was a joy, and not a chore: it was his earthly purpose, to bring glory to his Creator! We should, therefore, be eager to fulfil our calling by being ready and willing to go to work—and to communicate this positive attitude to our colleagues. Work is not something to be avoided, but to be sought, because that is what we were made to do! Of course, since the Fall, work has become hard and unpleasant to an extent, but that does not change our basic calling. What a difference such a view of work can make, in our timekeeping, our willingness to work, and our joy in doing it well.

Nevertheless, not only does work have a purpose, but it will be judged. If a schoolchild believes that his beautiful work of art is going to be screwed up and thrown in the bin immediately he has done it, he will have no motivation or enthusiasm! However, if he knows that it will be pinned up on the wall for all to see, and the teacher will mark it, he will work assiduously. We know that our work will be judged when the Lord returns and this doctrine of the final judgement is also inseparable from Creation.

Everyone is worthy of respect and love, whatever work they do, and whatever their sex, class, or culture. There are no jobs which we class as 'menial' and therefore we do not treat those who do them with any less respect, as people, than the Managing Director! In a truly Christian society, many of our employment laws would be unnecessary, as fairness and lack of prejudice would characterise a Christian in dealing with these issues. There are, of course, legitimate areas of discrimination, where moral issues are involved.

By His example, in resting on the seventh day, God gave it to mankind as a necessary day of rest (as mentioned above). This is the clear pattern established for mankind at his beginning, for his own good, and we cast aside this pattern at our peril. Rest is very much part of work, for without rest, we would cease to work!

The world is not ours to consume as we please, neither is it 'sacred' so that we may not touch it, but it is both to be used and taken care of. This idea of 'stewardship' gives a balance in our dealings which is often lacking in business. We are able to make value judgments which are sometimes submerged by commercial pressures in today's harsh environment. (I wonder whether evolutionary ideas have in fact produced the harsh and unfeeling business environment of today?) We recognise the delicate balance of the world as God created it, and that our genetic makeup, albeit marred by the ravages of sin, is a marvel of creation.

Perhaps most important of all, there is a purpose to life, to the world: the salvation of sinners (Matthew 25:34) to the glory of Jesus Christ (Colossians 1:16). This gives purpose to our work also. By the way we work, we can witness to that Saviour, as well as by the way we talk, the way we speak to and about our colleagues, and the way we do our best to help them.

The Greatest Work

We should not overlook perhaps the greatest lesson that Genesis teaches us about work: that the first and greatest example of work is the Creation itself: that incredible accomplishment of the great Worker Himself. God was at work and being in the image of God means that we are created workers as well. The expanse, the majesty and the beauty of creation, in its minutest yet-to-be-discovered detail, to its vastest incomprehensible structure, speaks of the Creator's delight in the work of His hands, His joy in craftsmanship: and the whole sings back His praises: 'The heavens declare the glory of God: the skies proclaim the work of his hands' (Psalm 19:1).

This should be our inspiration, our model, in the world of work. Our God showed us what work was meant to be—what it could be—by this example. And let us not confine 'work' to the area of paid occupations—though we have concentrated on that in this article—but remember that it includes the gardening, bathing the baby and other such necessary activities!

God rested from His work of creation on the seventh day, but He did not thereafter cease to work! Our Lord Jesus Christ said, in reply to those who persecuted Him concerning the Sabbath, 'My Father is always at work to this very day, and I, too, am working' (John 5:17). And His great work, the greatest work of all, was the work of salvation, His work upon the cross. As He drew close to this hour, He said 'I have brought You glory on earth by completing the work that You gave Me to do. And now, Father, glorify Me in Your presence with the glory I had with You before the world began' (John 17:4,5). When God created all things, He knowingly created the theatre in which the drama of redemption would be played out. When He created man, He created the creature whose form His Son would take in order to save mankind and re-create all things.

Conclusion

Most of us spend the majority of our 'working lives' at work! This is where our lives are lived out in reality and it is perhaps the hardest place to be consistent. But the Bible shows us that work is what we were created for and, therefore, we need to see what God has to say about it. As we have seen, our beliefs as to our origins have a clear influence on our attitudes to the whole subject of work. But it may be that we believe the Bible's teaching on Creation, but still accept many of the ideas and attitudes that arise from evolutionary philosophy. We need to think these things through carefully and let the Scriptures transform our thinking.

THE AUTHOR

We welcome the return of Mike Matthews to the pages of *Origins*. Mike was the first editor of the journal and responsible for the development of its current format.

'But in the late twentieth century, bereft of the biblical limitations by a generation that has turned away from Christian faith, history pursues its mad career, running amuck with saviours making rules that they crown with divine status. History thus dechristianized has no moral limitations. "Right" is a moving target, propelled by the march of facts and sentiments. Theft, homosexuality, pornography, genocide, and torture were wrong yesterday, but tomorrow who can say? Perhaps we shall find compelling national, social, or economic interests that require us to do things that would not have been contemplated without horror a short time ago, and perhaps we shall find that they are "right." A society that cannot tolerate a judge beyond history will find that it can learn to tolerate anything else.'

Schlossberg, H. 1990. *Idols for destruction. The conflict of Christian faith and American culture.* Crossway Books, Wheaton, Illinois, p.37.

Creation Research and the Community of Jesus

An introduction to the German creationist group, Wort und Wissen

Reinhard Junker

THE STUDY group *Wort und Wissen* (the German words for 'Word and Knowledge') exists to help both Christians and non-Christians understand and interpret scientific knowledge on the basis of the Bible, the Word of God. In relation to 'objective' scientific findings, belief grounded in the Bible is often presented to the public as something untenable, or of no consequence.

Through the teaching of evolution and the way it is communicated in textbooks and the mass media, the idea of God acting and creating sovereignly appears to be obsolete, or at least unnecessary for understanding the history of man, his present situation and his perspective on the future.

Man's ancestry and the meaning which is ascribed to it are themes picked up again and again in the media. So, just before Christmas, magazines such as *Stern* and *Focus* publish leading articles in which evolution is presented as an unquestionable fact. A contribution in *Stern*, for example, which drew comparisons between the development of the human embryo and that of animals, ended with the sentence: 'Without question, the worm is our brother' (meaning that we have a common ancestry).

Why, then, creation research?

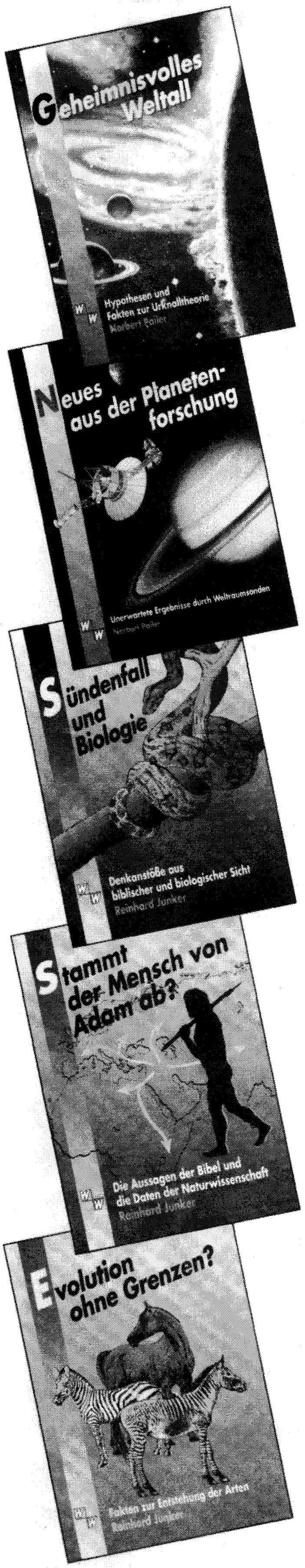
Christians react to this situation in various ways. Some, shrugging their shoulders, may wonder why the whole thing should have any importance for Christian belief, and hence consider 'theistic evolution' to be acceptable. Others feel themselves perhaps (and understandably!) helpless in the face of the overpoweringly one-sided propagation and interpretation of scientific facts. They stay clear of the subject and do not allow themselves to be irritated, but then cannot give any help to those who find that it 'gnaws at their bones.' Others, again, try to fight back but, not possessing the appropriate means, resort to condemning the theory of evolution wholesale. Those who think otherwise are certainly not moved by this to reflect upon their position; nor do they receive any stimulus towards belief.

To be sure, human arguments—even the most valid, indisputable and scientific ones—are not sufficient to bring about faith in Jesus Christ. On the other hand, the New Testament speaks about making an effort to spread the gospel and win believers (*e.g.* Colossians 1:29) and about needing to encounter unbelievers—so far as possible and of course in an ethically defensible manner—in the realm of their life and thought (*e.g.* 1 Corinthians 9:19–22). God's power and commissioning of human beings and the effort which results therefrom all belong together in the New Testament. In this sense the work of the study group *Wort und Wissen* should be understood as a task which is laid upon the Christian community as a whole, the body of Jesus Christ—that of meeting the scientist or anyone conditioned by science (and today that is every pupil) in the field of thought and science, in order to sweep away obstacles that stand, or appear to stand, in the way of faith based on the Bible.

An essential part of the work undertaken with this goal in mind consists of thinking through particular scientific questions, predominantly with the aid of the academic literature already to hand, even though it is written from an evolutionist point of view. For financial and personal reasons, primary research is hardly possible, so that (as a rule) no alternative exists other than to resort to the available literature. At present three full-time workers from *Wort und Wissen* invest a large part of their time in such research. In addition, two others are in receipt of scholarships, and there is a varying number of around 10 to 15 voluntary workers who in the limited free time at their disposal likewise strive to pursue scientific projects. It is the conviction of these colleagues that to argue against the monopoly position of evolution theory in an all-encompassing and merely general way is not enough. Rather, we must show, at least with examples (more is often not possible), that nature and its history need not in fact be seen through the spectacles of evolutionary philosophy but may also be interpreted within the framework of biblical tradition. Without detailed scientific work, however, this cannot be done.

In the end, therefore, such work should contribute towards defusing objections against the Word of God, so that the invitation and demands of the gospel are not obstructed unnecessarily by reference to facts which appear to be scientifically established.

Of course, research in general—independently of the actual discussion—should lead to the greater praise of the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Creator. As the Psalmist says: 'Great are the works of the Lord, studied by all who have pleasure in them' (Psalm 111:2). Nonetheless, research is always taking place against the background of the present day's continual rejection of the testimony to the Creation in the Bible. The various motives for doing research from a biblical perspective are interrelated, but in the foreground of creation research is particularly the desire to bring out into the open, against the general trend, the subject of the Creation and Creator.

Because of the very small number of workers and resources, the ability to do this effectively is certainly limited. Out of the multitude of subjects that require treatment only a very few can be tackled. An endeavour so small might easily be overlooked by the 'scientific establishment.' That this is increasingly *not* happening, can be taken as a sign that the work is being blessed by God. We know that in His kingdom *God* can open doors, if we also apply a little effort (*cf.* Revelation 3:8). For example, a single academic publication, although read by only a few, can itself open doors (*e.g.* to an institution for further education), if important persons become aware of it and allow themselves to be convinced by the quality of the work (not unconnected from the Christian worldview that lies behind it). This far from contrived example should make it clear how academic work can have strategic significance. But the need for this work can also be justified on a wider basis, for, as will be shown, it is important for the Christian community as a whole.

Usefulness for the community

The need for scientific work is not easy to convey. This is understandable, since unless one is scientifically trained, one can enter into the thought-world of the profession only with a great effort. Put simply and exaggeratedly: how should months and years of work on questions of detail make a contribution to evangelisation? The question is a legitimate one. It can only be answered if we bear in mind the larger connection between science and education and pursue a long-term strategy. For reasons of space just one example can be given: without careful scientific work—and this cannot be done superficially—we lack any basis for alternative instruction, whether we are talking about biology and geography in secondary school or about communicating such subjects to primary school pupils. That is just as true for state schools as for denominational schools. Teachers who are Christians need to be undergirded academically. No one likes to teach things which are insufficiently attested. Even teachers who are not motivated by Christian belief can be induced to reflect critically about the theory of evolution. However, they will do so only if the arguments can withstand academic scrutiny. If we as Christians wish to say more than just, 'The Bible says something else,' we cannot avoid putting ourselves to the effort of scientific work at a fundamental level. For that, one needs appropriate academic training. Accordingly, it is for that reason that *Wort und Wissen* seeks to encourage young people.

It is like when a missionary in a foreign culture wishes to communicate the gospel and win people for Jesus Christ: first he needs a year's training in order to become well versed in the language and customs, so that he may make himself understood and be accepted. Here too one could put the question, of what direct use for evangelisation is the acquisition of a foreign language. Its usefulness comes about only in an indirect way. And so it is with the study of scientific subjects.

What has already been published?

The series of academic reports known as *Studium Integrale* began in 1989 with the two volumes *Ramapithecus—Man's Forefather?* by Sigrid Hartwig-Scherer and *Rudimentary Organs and Atavism—Mistakes in Constructing Life?* by Reinhard Junker. The first of these portrays how in the course of time *Ramapithecus*, a fossil originally interpreted as ancestral to man, was reinterpreted as an antecedent of the Orang-utan (or indeed as the same species), and it explains the factors which led to this re-interpretation. *Rudimentary Organs* addresses the argument that the creation is not optimally designed and therefore speaks against a Creator.

The third volume to appear was Michael Brandt's *Brain and Speech*, which reported on investigations into human and ape-man fossils. In the process of determining the intellectual capacities of these forms, it has become clear that there exists an appreciable gap between human and non-human. At the same point these boundaries also show themselves in relation to the mode of locomotion, as Michael Brandt explained in his follow-up work, *The Origin of Walking Upright*, which appeared in 1995.

Meanwhile, in 1993 two further books were published: a theological contribution from Reinhard Junker on 'theistic evolution' (title: *'Living through dying? Creation, salvation history and evolution'*) and a collection of papers by eleven different authors on 'basic types' edited by Siegfried Scherer. The latter work presents in detail a number of basic types (these are interpreted in creation theory as modern-day descendants of the original kinds). In 1995 a further theological volume appeared under the title *Communication and Serving God*, by Markus Piennisch. This discusses the question of how preaching in the community can be understood as communicating the concerns of God. In the same year, *Wort und Wissen* published a collection of papers edited by Reinhard Haupt and Werner Lachmann on evolutionism in the field of economics (*Self-organisation in markets and in management?*).

Finally, in 1996, with the ninth and tenth titles in the series a small (and unnoticed) jubilee could be celebrated with the ninth and tenth titles in the series. In his contribution on palæobotany, *Evolution of the Earliest Land Plants*, Reinhard Junker showed that the diversity of the early land plants is difficult to order into an evolutionary sequence. Siegfried Scherer's work on the *Origin of Photosynthesis*, written in collaboration with Laurence Loewe, demonstrated that no mechanism for macro-evolution is known at the present time, and explained why none is known. Further titles are currently in preparation.

Studium Integrale Journal

Since 1994 the above series of academic reports has been supplemented by the *Studium Integrale Journal*, appearing twice a year. With this publication the goal being pursued is similar to that of the book titles. However, most of the contributions are much easier to read than the monographs, require less prior knowledge, and are directed at a wider public interested in questions of natural science. The spectrum of subjects embraces archæology, astronomy, biology, chemistry, earth sciences and the theory of science. The *Journal* facilitates general overviews of subjects involving questions of origin and is intended to keep the reader in touch with the scientific work being done both by *Wort und Wissen* and by other researchers who are critical of aspects of evolution.

Procedure

In the monographs, just as much as in the *Studium Integrale Journal*, the philosophical standpoint is not elaborated upon. In the main the argumentation remains on an academic level. Occasionally this procedure is criticised, on the grounds that one should always put one's cards on the table. At *Wort und Wissen*, however, we regard the *Studium Integrale* publications as only one tool among others. Not every tool must or can be of use for every task. The *Studium Integrale* books and journals are to be utilised as tools in the sense outlined above, in which criticism of evolution is brought into academic discussion and 'undergirding' is provided for more popular and didactic treatments that can be used in schools and communities.

One example, representing many. The popular-level booklet *Does Mankind Descend from Adam?*, which in four years has gone through four editions, could not have been written without the above-mentioned works of Sigrid Hartwig-Scherer and Michael Brandt. Much the same applies to the teaching materials and slide sets based upon them, which are available through *Wort und Wissen's* media division.

What is being worked on at the moment?

At present the three workers who are engaged as full-time scientists are working in the fields of amber research and the chemistry of the so-called 'primeval soup' (Dr. Harald Binder), geothermy and plate tectonics (Dr. Thomas Fritzsche) and palæobotany (Dr. Reinhard Junker). They are concerned with the following areas. In amber research, Harald Binder is looking, among other things, into evidences that amber formed in catastrophic conditions—here, possibly, lies a building block for the model of a young earth. In the foreground of his work on the theory of a primeval soup is the criticism of models which postulate that life arose out of non-living materials. The goal of the geothermy project is to model geological processes which are connected with plate tectonics (continental drift). Under investigation is whether the equivalent processes are conceivable according to the present state of knowledge within a short biblical timescale. Finally, in the field of palæobotany the concern is to examine evolutionary phylogenies and the question of transitional forms in the presumed evolution of plants, and to develop alternative models and interpretations for the regular order, observable worldwide, in which fossils were deposited. The two colleagues who have scholarships work in the fields of 'the origin of biological information' and 'micro-evolution (splitting of basic types) in the case of humming-birds.'

Criticism of evolution—a witness for Jesus?

In conclusion, two other matters need to be addressed. The first is the question of how far a purely scientific discussion (as, for example, in the *Studium Integrale* series or the *Studium Integrale Journal*) can provide any stimulus towards believing in Jesus. Here we might refer to our repeated experience that criticism of the monopoly position of evolution theory is already prompting questions about its motivation, as well as about alternatives, and in consequence one is immediately plunged into the heart of the matter, *viz.* whether there exists a Creator, how does He stand in relation to me and what does He require of me. But the questions must come from those who come into contact with us. Otherwise we may be answering questions which no one is asking. Questions which are important for life can be provoked simply by our placing in the arena the statement that evolution theory is not the only explanation for the diversity of life and the existence of man. To this extent criticism of evolution can indeed lead to a witness for Jesus.

Ways in which to give support

The other matter to be addressed is how you, dear readers, can contribute to the dissemination of this academic literature. For one thing, those interested in the natural sciences should buy or subscribe to the *Studium Integrale* publications. Publishing such literature also has an economic component: at the moment it must be subsidised out of donations. You can help to reduce the burden of these subsidies by strategically gifting the literature and *Studium Integrale Journal*, for example, to the teacher's library of the nearest secondary school or other suitable libraries (in so doing it is important to hand over the books or magazine personally). In such ways you can contribute significantly to introducing these ideas to the principal target group. Reaching the secular realm, for which this literature is especially intended, has proved to be very difficult. Experience shows that personal involvement is the most likely to bring success.

This article (slightly adapted) is translated from an article which originally appeared in the September 1997 issue of Info, *the bulletin of* Wort und Wissen.

Haeckel's Embryos

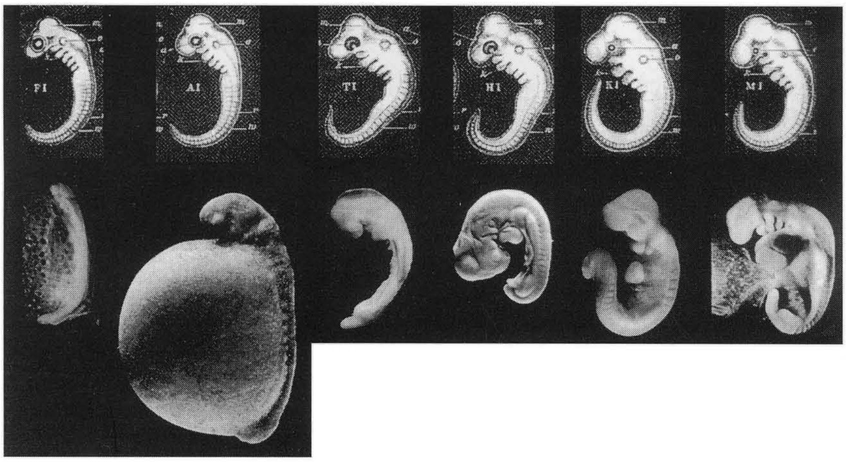
ONE of the popular arguments against the biblical account of special creation is the claim that all embryos recall a common evolutionary path. Though this has been known to be a false argument for many years, it is still used at a popular level. Many creationist books have shown that the original work by Ernest Frederick Haeckel was fraudulent, but, at last, a definitive paper has been published in the academic journals demonstrating this.

Haeckel was a professor of comparative anatomy at the University of Jena from around 1860 and produced a series of pictures purporting to show this common ancestry. He proposed the 'law' that *ontogeny recapitulates phylogeny.*

The fraud was exposed and reported in 1874 (*Unsere Korperform* by Wilhelm His; Voegel, Leipzig). Professor W. R. Thompson, in his introduction to *Origin of Species* (1956 reprint), says that 'When the "convergence" of embryos was not entirely satisfactory, Haeckel altered the illustrations to fit his theory.' According to Michael Pitman (*Adam and Evolution: A Scientific Critique of Neo-Darwinism;* Rider, London), Haeckel appeared at a university court charged with fraud and agreed that a small percentage of his figures were forgeries.

The recent work by Dr. Michael Richardson *et al* compares the diagrams drawn by Haeckel and his own photographs of the corresponding embryos. The difference is so marked that one wonders how such a fraud even 'got off the ground.'

How long will it take to die out from the realm of popular mythology?



Left to right: Embryos of fish, salamander, turtle, chicken, rabbit and human. The top row is as published by Haeckel, the lower row shows Dr. Richardson's corresponding photographs.

News of Creation

Just Who Was Neanderthal Man?

NEANDERTHAL Man (often written as Neandertal Man now) has been in the news quite a bit lately. Traditionally he has been seen as a link on the tree from ape-men to modern man *(Homo sapiens)*. Increasingly it was recognised that he was not very different from us and became recognised as a branch from *H. sapiens*. Recently studies from recovered DNA have upset the picture and he has been relegated to an extinct branch evolved from a common ancestor with ourselves. What can we say about this from a biblical viewpoint?

His remains were first identified in the Neander Valley in Germany (hence his name!), but have been located in a number of sites across Europe. He has been pictured as the classic cave man, brutish and lacking any social or cultural skills. We hear his name taken in vain frequently when someone seeks to speak disparagingly of his neighbour. This is unfair, inaccurate and unbiblical! One of the problems for the scientist classifying Neanderthal Man (or any other primate remains) is that no-one has defined a human being (outside of Scripture). Johanson, the discoverer of *Lucy*, sums this up as follows:

> 'It may seem ridiculous for science to have been talking about humans and pre-humans and proto-humans for more than a century without ever nailing down what a human was. Ridiculous or not, that was the situation. We do not have even today, an agreed-on definition of human-kind, a clear set of specifications that will enable any anthropologist in the world to say quickly and with confidence this one is human; that one isn't.'

A study of his occurrence and chronology makes it clear that he was a survivor of the Ice Age. This gives us the clue to many of the apparent differences from ourselves. Not only is he contemporary with modern man, but he clearly lived alongside him, in the same place and probably intermarried with him. (A useful book for children—and their parents! —is *Life in the Great Ice Age*, by Michael Oard, which describes the interaction of Neanderthal Man and *Homo sapiens.*) As one who migrated from the Middle East (following the Babel dispersion), he came up against the ice fields of the Ice Age. These would have been hard days with little sun and so poor vegetation. Having moved into an uninhabited area, he would not have been able to visit the local estate agent and buy a house. He would look for available shelter in which to be warm and protected against the cold environment. If he stayed put long enough, he would have developed new buildings, of course. In other words, he would have done exactly what we would do if we were landed on a 'desert island.' Indeed, there are many people who live in caves today and they are in no way inferior to the rest of us. The conclusion that they should be inferior is the result of evolutionary bias, not fact.

Figure 2: Cave art

What do we know about him?

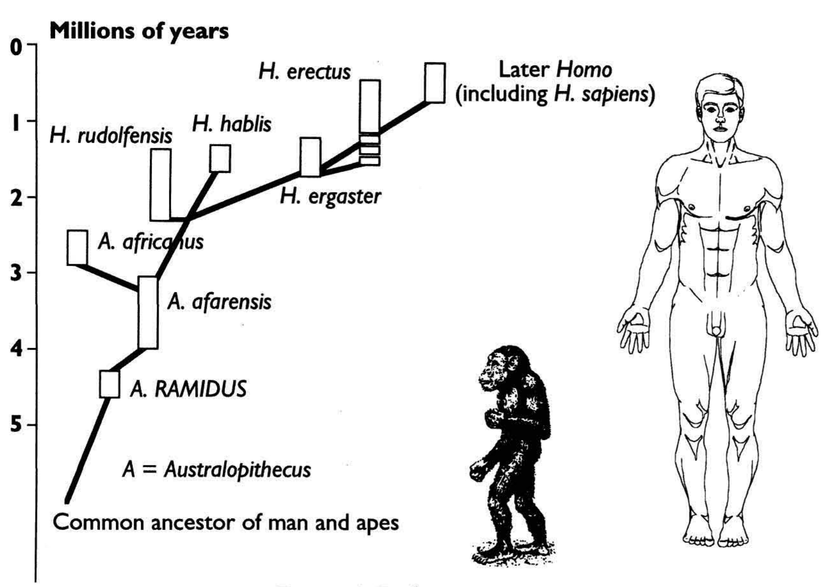


Figure 1: Evolutionary tree

Culture

Archæologists have been unearthing much evidence of his culture. For a long time we have known of his flint tools (*not* primitive), his use of pottery, skins and leather-working. There is extensive evidence of his use of fire (commonly used as a distinctive human activity). His use of flowers and other artifacts in burial demonstrates that he had a concept of an after-life. In France, at La Ferrassie, there is some evidence of a grave marker. He was also one who cared for the lame and old. There is evidence of pharmacological understanding (in that he used plants for the relief of pain and spasm), dentistry and surgery.

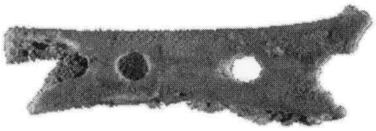


Figure 3: A Neanderthal flute

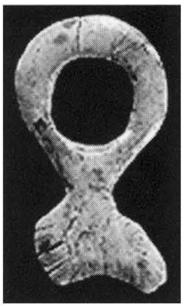


Figure 4: A Neanderthal pendant

A number of musical instruments have been found. For example, there are reports of the discovery in 1996 of a flute in Slovenia, made from a bear femur. Todkopf claims to have discovered a 'tuba' (made from a mastodon tusk in the Neander Valley, with sixteen holes), a bagpipe, a triangle (from bones) and even, possibly, a xylophone! There have been several examples of art and personal ornaments developed from bone and stone (*e.g.* at La Quina, France). A cave painting has been found which seems to indicate a musical group.

Recently, Dr. Chris Stringer at the Natural History Museum, London, has been studying Neanderthal remains in Gibraltar. He has studied the range of plant material used by this man and has been struck by his clear sense of aromatic taste. He was a discerning cook, using nuts, olives and a variety of meats (rabbit, deer, wild goat, *etc.*). So remarkable (or surprising!) was this discovery of a sensitive palate, that some have suggested that this was the beginning of aromatherapy!

Morphology

In spite of the volumes that have been written on his distinctive morphology, there is little reason to believe it was essentially different from that of modern man. The variations found in Neanderthal Man are to be found in modern Europeans. The bone variations have been identified as arising from disease (*e.g.* arthritis, rickets, syphilis), environment, diet and culture. As we have noted, he lived in the freezing environments of the Ice Age and so was deprived of adequate nutrition.

He was probably stronger than modern man, stockier and, on average, had a larger brain than us. Dr. J. W. Cuozzo, an orthodontist, has studied a number of skulls of juvenile Neanderthals and concluded that the reconstructions have been biased by evolutionary views and alternative reconstructions are not only possible but required scientifically. These show that the difference in

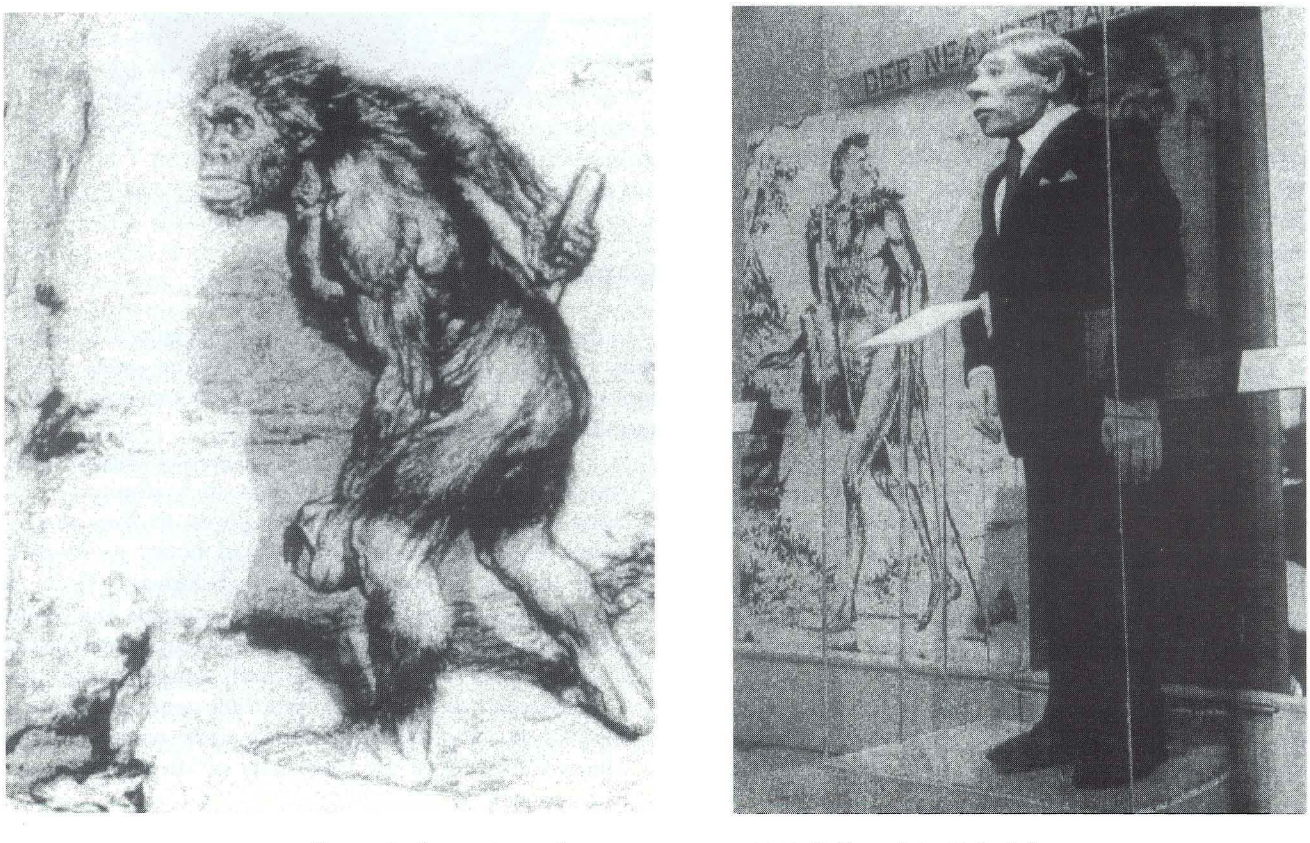


Figure 5: Comparison of reconstructions—1909 (left) and 1990 (right)

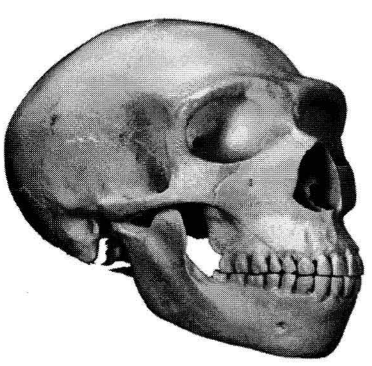


Figure 6: A reconstructed Neanderthal skull

jaw and chin structures is minimal if it is present at all.

Marshack comments that he has 'a cognitive ability for abstraction, modelling and manufacturing something other than tools.' How much does he have to demonstrate before he is classified as *Homo sapiens*?

Kay, Cartmill and Balow of Duke University have been studying the hypoglossal canal of Neanderthal Man. This is important to speech because it carries the motor nerve that controls the tongue. The canal closely matched that of man and was distinctive from that of the apes. They concluded that Neanderthal Man could probably talk.

Genetics

S. Pääbo and colleagues reported their studies on the DNA of Neanderthal Man and concluded that he was not in the direct line of man, but probably deviated from him some 500,000 years ago ... What do we make of this?

It is interesting to note, first of all, that they isolated DNA—against all the predictions. It is known that DNA self-destructs within ten thousand years, yet here it was found in the upper arm bone from a specimen at least tens of thousands of years old. This has been hailed as outstanding work (as it was), yet all other claims to have isolated ancient DNA have been dismissed as contaminations!

The key to this work was the isolation of mitochondrial DNA (mtDNA). This is more extensive than the nuclear DNA, but is also significant in that it is passed only through the female line. As a result we can monitor how it changes from generation to generation. These workers isolated a 379 unit sequence in DNA and compared it with modern humans. It differed at 27 points, compared with an eight point variation in modern humans.

Let us look at the data more closely. This is a statistical comparison and such analyses should always be examined carefully. The section studied is only a small segment: 379 out of a possible 16,500 unit fragment. It would be instructive to see if this was an abnormal difference between Neanderthal Man and modern man. But the differences are even less significant when we look at the actual data:

The variations in modern man ranged between 1 and 24;
The variations between Neanderthal Man and modern man ranged from 22–34;
The variation between chimps and modern man and Neanderthal Man ranged from 46–67.

From this, we see that there is an overlap between Neanderthal Man and modern man, each being dramatically different from the chimpanzees. The data becomes even more meaningless when we note that modern man variations were based on 994 different sequences in 1669 people, where as Neanderthal Man's studies were based on one sequence from one man. (The chimp sample was 55).

Other experts have noted the unreliability of this data. Easteal reckoned that the amount of diversity in the specimen is not exceptional. Wolpoff comments that isolated communities can accumulate variations in DNA and appear very different from the majority. This specimen of Neanderthal Man is not typical. Further, recent studies on the use of mtDNA as a marker has suggested that it may be less reliable than has been assumed thus far.

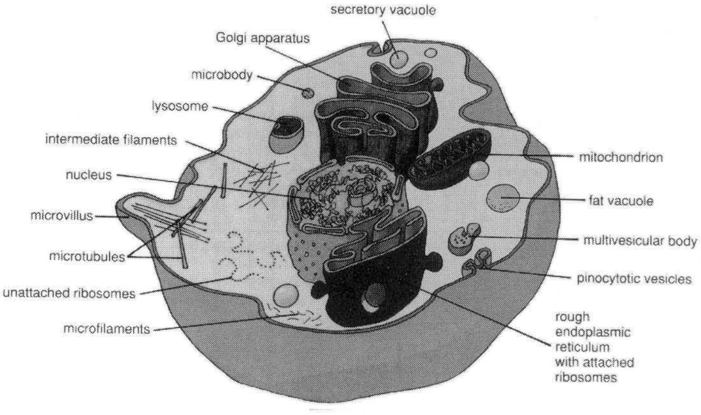


Figure 7: Cross-section of a cell showing mitochondrion

Conclusion

From all this, culture, morphology and genetics, we see that Neanderthal Man demands a better press and a recognition of his true identity. John Corcoran, a BCS member, wrote to the editors:

> 'They would have suffered some genetic degeneration but also, over several generations, they adapted to the harsh environment where they chose to live: stocky, heat-conserving bodies and broad noses to moisten cold dry air like today's Inuit (Eskimos). There is historical precedent for a race of humans becoming extinct. ... Likewise, through disease, murder, climate change and interbreeding with other races, the Neanderthals disappeared. 'But their genes continue in modern Europeans today,' insists palæoanthropologist Milford Wolpoff of the University of Michigan.'

J.H.J.P.

It's a Horse, of Course!

A creationist view of phylogenetic change in the equid family

Paul Garner

The fossil record of horses has often featured in the debate between creationists and evolutionists about origins. Horses are particularly well represented in the geological record, especially in North America, and appear to form a convincing, though complex, evolutionary sequence. Many see the horse series as a major challenge to a creationist view of earth history. Thus, evolutionists have cited the series as important evidence in support of their theory, while creationists have attempted to debunk it as artificial and composed of non-equivalent parts.

I believe that both these positions are mistaken. In this article, I want to explain why. However, I do not wish to be merely negative. The ethos of the Biblical Creation Society is to encourage the development of strong and vigorous alternatives to evolutionary thinking. In that spirit I will propose an alternative creationist approach to the famous horse series, one that has been hinted at by others previously.

Microevolution —— change within a species
Speciation ——— evolution of new species

Macroevolution — new genera
new families
new orders ——— Megaevolution
new phyla

Figure 1: Some definitions related to evolutionary change

Some preliminary clarifications about the definition of 'evolution'

It would perhaps be helpful if I first defined some terms. There is a great deal of confusion in the creationist and evolutionist literature about what we mean by 'evolution.' My view is that the terminology proposed by Brand (1997, pp.111–126) is useful in dispelling some of the confusion (Figure 1). I am aware that some creationists will disagree with me about the value of this terminology—perhaps this article will stimulate a more extended discussion in *Origins*—but it provides a platform for us to think the issues through. Brand defines *microevolution* as change within a species, *speciation* as the origin of new species, and *macroevolution* as the origin of new genera, families, orders, or phyla. *Megaevolution*, a subset of macroevolution, is the origin of new families, orders, or phyla. Brand argues that a biblical creationist can accept microevolution and even some macroevolution, at least to the development of new genera. He describes some of the scientific evidence that supports this view and points out that there is nothing in the Bible to contradict this. However, he rejects the idea of megaevolution and proposes limits to the changes that evolution can produce—there appears, for instance, to be no known genetic process that can produce entirely new body plans (Brand, 1997, pp.168–171). Therefore, when we examine the data relating to fossil horses, we need to determine what level of evolutionary change we are dealing with.

All the extinct and extant horses mentioned in this article belong to the family Equidæ of the order Perissodactyla (Carroll, 1988, p.644). Therefore, if the horse series from *Hyracotherium* to *Equus* is a genuine phylogeny ('family tree'), we are dealing with biological variation within the taxonomic rank of family. This level of change would, using Brand's terminology, be defined as *macro*evolution, but would not be considered an example of *mega*evolution. Since it is only megaevolution that appears to meet insuperable biblical and scientific barriers, we can approach the horse series with minds open to the possibility that these fossil animals really were all genetically related.

A brief description of the horse series

Many scientists regard the horse series as powerful evidence in favour of evolutionary theory. In his major textbook on vertebrate palæontology, Carroll (1988, p.533) states:

> 'The extensive fossil record of the family Equidæ provides an excellent example of long-term, large-scale evolutionary change. Changes in body size, skull proportions, dentition, limb structure, and relative brain size have all been thoroughly documented.'

The horse series frequently features in books and articles written by opponents of creationism (*e.g.*, Futuyma, 1995, pp.85–94; McGowan, 1984, pp.142–148; Monroe, 1985). We need to review the horse series to see why so many scientists believe it offers evolutionary theory such strong support. We will look first at the so-called main line of evolution from *Hyracotherium* to *Equus*, as it is generally portrayed in textbooks and museum exhibits. Later, I will develop the point that this lineage is not just an oversimplification of the available data, but so grossly oversimplified that it is actually misleading.

Hyracotherium to *Epihippus*

According to current thinking, the root of the family tree of the horse is to be found in a small creature called *Hyracotherium*, whose fossils are known from the Lower Eocene of North America and Europe. *Hyracotherium* was first described by the famous naturalist and anti-evolutionist Richard Owen based on specimens recovered in 1838 from the London Clay (Owen, 1840). Specimens found in North America were called 'Eohippus' ('dawn horse'), but subsequent studies led most palæontologists to conclude that 'Eohippus' and *Hyracotherium* were one and the same genus (Forster-Cooper, 1932; Simpson, 1952). Under the rules of zoological nomenclature the earlier name had precedence, so the name 'Eohippus' was dropped, although it is occasionally still found, erroneously, in popular presentations of the horse series.

Hyracotherium was a small mammal with four toes on the front feet and three on the rear. It was a brachyodont (*i.e.*, had low-crowned teeth), with four premolars and three molars in each jaw. Its characteristics are those of a forest-dwelling animal that browsed on foliage. The lineage in North America can be traced from *Hyracotherium* (Lower Eocene) to *Orohippus* (Middle Eocene) and *Epihippus* (Upper Eocene). The differences between these three genera are slight. Monroe (1985, p.10) says that the upper premolars of *Orohippus* are more molariform than in *Hyracotherium*. According to Kitts (1957, p.1), '*Orohippus* and *Hyracotherium* are very similar to each other in almost all known anatomical characters.' Barnhart notes that the remains of *Orohippus*, mainly consisting of teeth, are found in only two formations in one geographic area, the Bridger Basin and Uinta Basin of Wyoming. He suggests that it is 'no more than an unrecognized variation of another genus' (Barnhart, 1984, p.111). The differences between *Orohippus* and *Epihippus* also appear to be primarily related to dentition. Monroe (1985, p.10) says of *Epihippus*, 'The upper and lower third and fourth premolars were molariform and the first lower premolar was single-rooted rather than double-rooted as in *Orohippus* and *Hyracotherium*.'

Mesohippus to *Parahippus*

Mesohippus, a sheep-sized Oligocene form, had only three toes on the forefoot. As in *Hyracotherium*, the teeth were brachyodont, but all except the first premolar were now molariform. *Mesohippus* appears to have become extinct by the middle Oligocene (MacFadden, 1992, p.175), and is thought to have given rise to the characteristic Miocene genus *Merychippus* via *Parahippus*. It is in *Parahippus* that the trend toward hypsodonty (*i.e.*, high-crowned teeth) and the addition of cement to the cheek teeth is first seen. Referring to *Parahippus*, Carroll says (1988, p.534):

> 'The teeth became high crowned to resist the greater wear of a diet of hard grasses. To accommodate the long roots of the cheek teeth (about 60 per cent their length in modern horses), the jaws and face became deepened and the tooth row was displaced anteriorly relative to the orbit and the jaw articulation. The zygomatic arch was strengthened by the completion of the postorbital bar. The high-crowned teeth were supported by a newly elaborated tissue, cement, which is soft but tough and serves to support the hard but brittle columns of enamel. The pattern of the molar and premolar lophs approached those of the modern horse. The muzzle was elongated to extend the reach of the enlarged incisors.'

Layman's summary

One of the most common arguments in favour of evolution is the fossil horse series. Well known from museum displays and textbooks, it portrays the development of today's modern, single-toed horse from the small, four-toed 'dawn horse.' The series shows how the horse 'gradually' increased in size, lost its side toes, and developed high-crowned teeth. What many people do not realize is that the series is much more complicated than the museums and books suggest. The family tree of the horse is more like a branching bush than a single straight trunk.

Most creationists have argued that the horse series is artificial. They say that the fossil horses are not really buried in rock layers one above another, but that evolutionists have arranged them this way to make it look like they evolved. They say that these horses are not really related to each other at all. However, the rock layers *do* appear to be found in the order the evolutionists say they are. Furthermore, all the horses belong to the same biological family. Some creationists have argued that the biological family is about the same as the biblical created 'kind.' If this is true, then maybe all these horses are just varieties of the same 'kind.'

In my article, I argue that the fossil horses really are all related. I suggest that the horse series is an example of variation within the kind after Noah's Flood. Genetic 'switches' may control whether horses are born with three toes or one toe. It seems that modern horses have the potential for extra toes, but that these are usually 'switched off' while the horse is still an embryo. Occasionally today, something goes wrong with the 'switch' and foals are born with extra toes. Perhaps the other changes (e.g. body size, shape of the teeth) were also controlled by genetic 'switches.' If so, this is simply variation within the created 'kind.' It is not an example of large-scale evolution.

Merychippus

The Miocene genus *Merychippus* also had three toes, but the central one apparently bore most of the weight (Thomason, 1986). The structure of the foot suggests that a strong elastic ligament, like that of modern horses, passed behind this central toe. The teeth were hypsodont, coated in cement, and had a more complex chewing surface.

> 'These specializations of the dentition and limbs point to Merychippus as a rapidly running, grazing animal of the newly expanded North American prairies' (Carroll, 1988 p.535).

Pliohippus to *Equus*

According to the evolutionary sequence, a branch from the *Merychippus* line led to *Pliohippus*, a late Miocene to Pliocene form. In *Pliohippus* the side toes became vestigial—though some species are now known to have been tridactyl (MacFadden, 1992, p.255)—and hypsodonty was increased further. A descendant lineage of *Pliohippus* gave rise to the Pleistocene genus *Equus*, which rapidly spread to Europe, Asia, Africa, and South America. However, by the end of the Pleistocene the genus was extinct in the New World. Nine species survive to this day in the Old World—the wild Asian horse, four species of asses, and four zebras (Carroll, 1988, p.535).

The 'major trends' of horse evolution

It is common to find this story presented in diagrammatic form illustrating what are considered to be the 'major trends' of horse evolution (increased body size, reduction of lateral toes, increased hypsodonty). One of the earliest such charts was prepared by the American vertebrate palæontologist Othniel C. Marsh in 1876 for visiting lecturer Thomas Huxley (MacFadden, 1992, pp.32–33). However, this diagram (Figure 2) was not drawn to scale, and therefore did not portray the marked size increase that would be made evident in subsequent presentations. A later example (Figure 3) produced in 1902 by palæontologist William Matthew includes the trend towards increased body size (MacFadden, 1992, p.45). Such diagrams are, as Gould (1997, p.57) points out, 'the most pervasive of all evolutionary icons.' However, the issue we must address is the extent to which these diagrams reflect reality. Do these illustrations encapsulate real trends evident in the fossil record? Let us, then, examine the so-called 'major trends' of horse evolution.

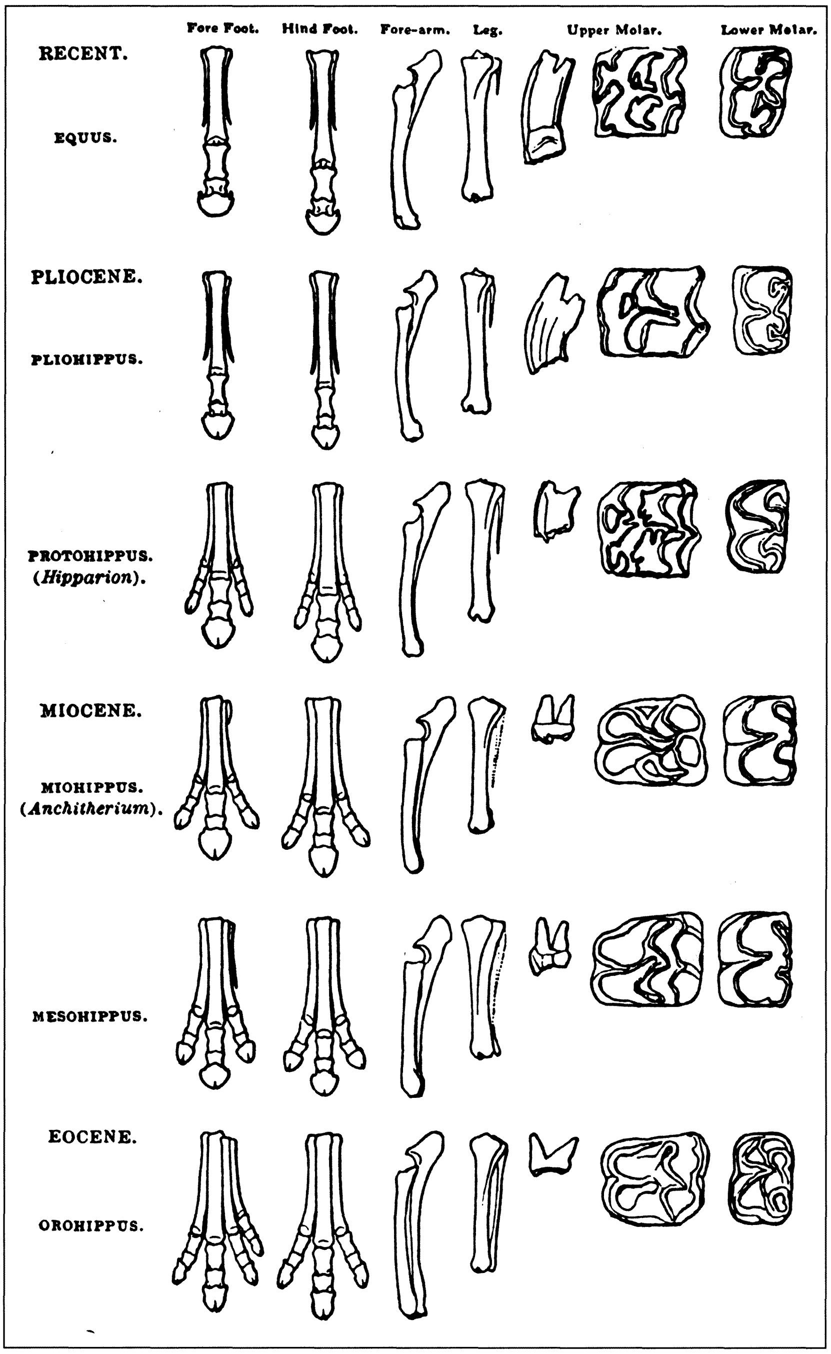


Figure 2: O. C. Marsh's illustration of the presumed evolution of North American fossil horses. Published in 1879, this diagram was originally prepared for Thomas Henry Huxley in 1876 for a keynote address he was to give at the founding ceremonies for The Johns Hopkins University. Orohippus *takes the place later reserved for 'Eohippus' because the latter had not been described at that time.*

In a limited sense, these trends are legitimate. There is a trend towards the loss of toes from four on the forefoot and three on the hindfoot of *Hyracotherium* (4/3), to 3/3 in *Mesohippus*, and 1/1 in *Equus*. There is a trend towards increased hypsodonty. All pre-Miocene horses were

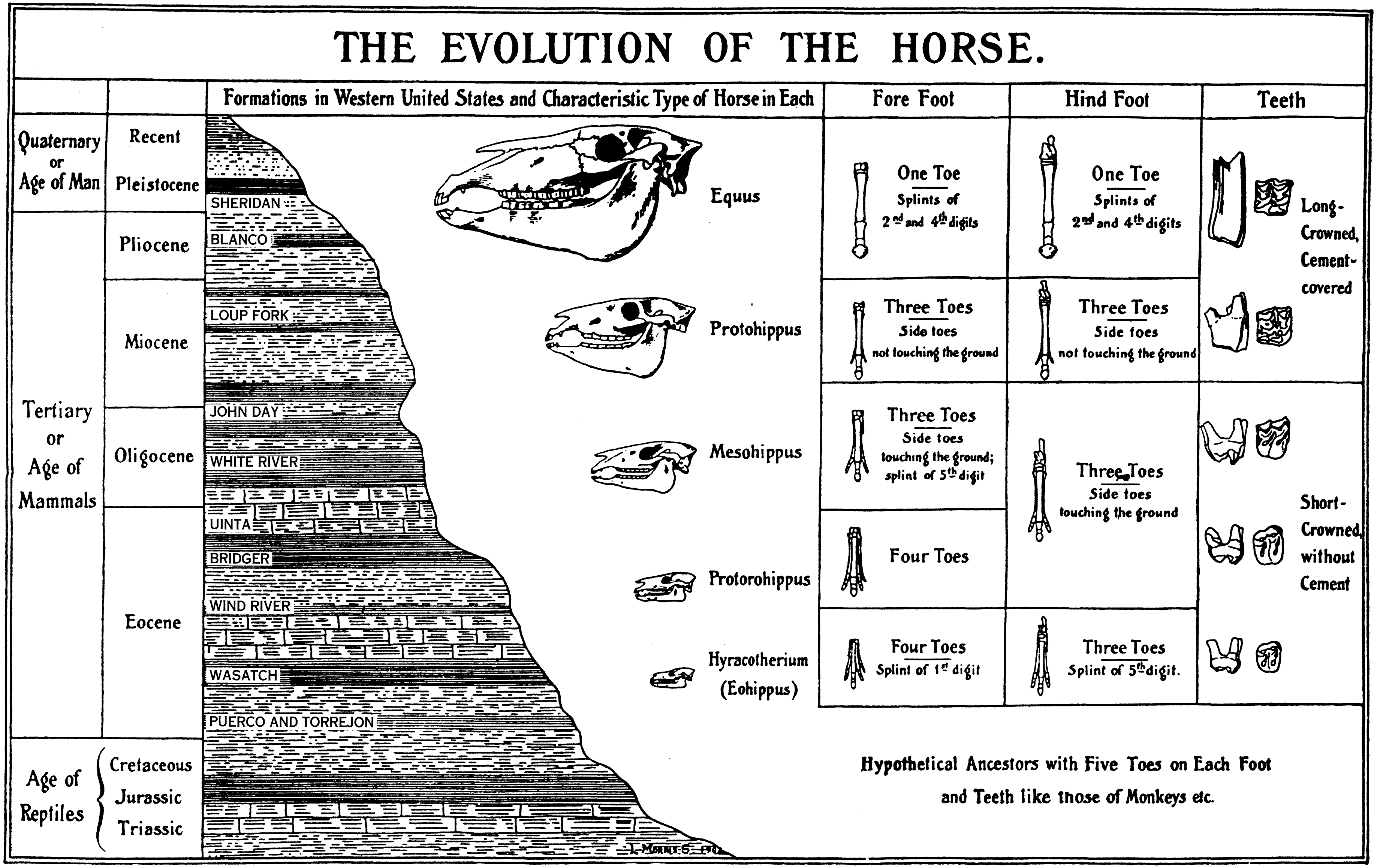

THE EVOLUTION OF THE HORSE.
Formations in Western United States and Characteristic Type of Horse in Each
Fore Foot
Hind Foot
Teeth
Quaternary or Age of Man
Recent
Pleistocene
Tertiary or Age of Mammals
Pliocene
Miocene
Oligocene
Eocene
Age of Reptiles
Cretaceous
Jurassic
Triassic
SHERIDAN
BLANCO
LOUP FORK
JOHN DAY
WHITE RIVER
UINTA
BRIDGER
WIND RIVER
WASATCH
PUERCO AND TORREJON
Equus
Protohippus
Mesohippus
Protorohippus
Hyracotherium (Eohippus)
One Toe
Splints of 2nd and 4th digits
One Toe
Splints of 2nd and 4th digits
Three Toes
Side toes not touching the ground
Three Toes
Side toes not touching the ground
Three Toes
Side toes touching the ground; splint of 5th digit
Three Toes
Side toes touching the ground
Four Toes
Four Toes
Splint of 1st digit
Three Toes
Splint of 5th digit.
Long-Crowned, Cement-covered
Short-Crowned, without Cement
Hypothetical Ancestors with Five Toes on Each Foot and Teeth like those of Monkeys etc.

Figure 3: A classic depiction of the evolution of the horse prepared by palaeontologist William Matthew in 1902. It clearly conveys the theme of progressive, unidirectional change seen in museum exhibits and textbook illustrations.

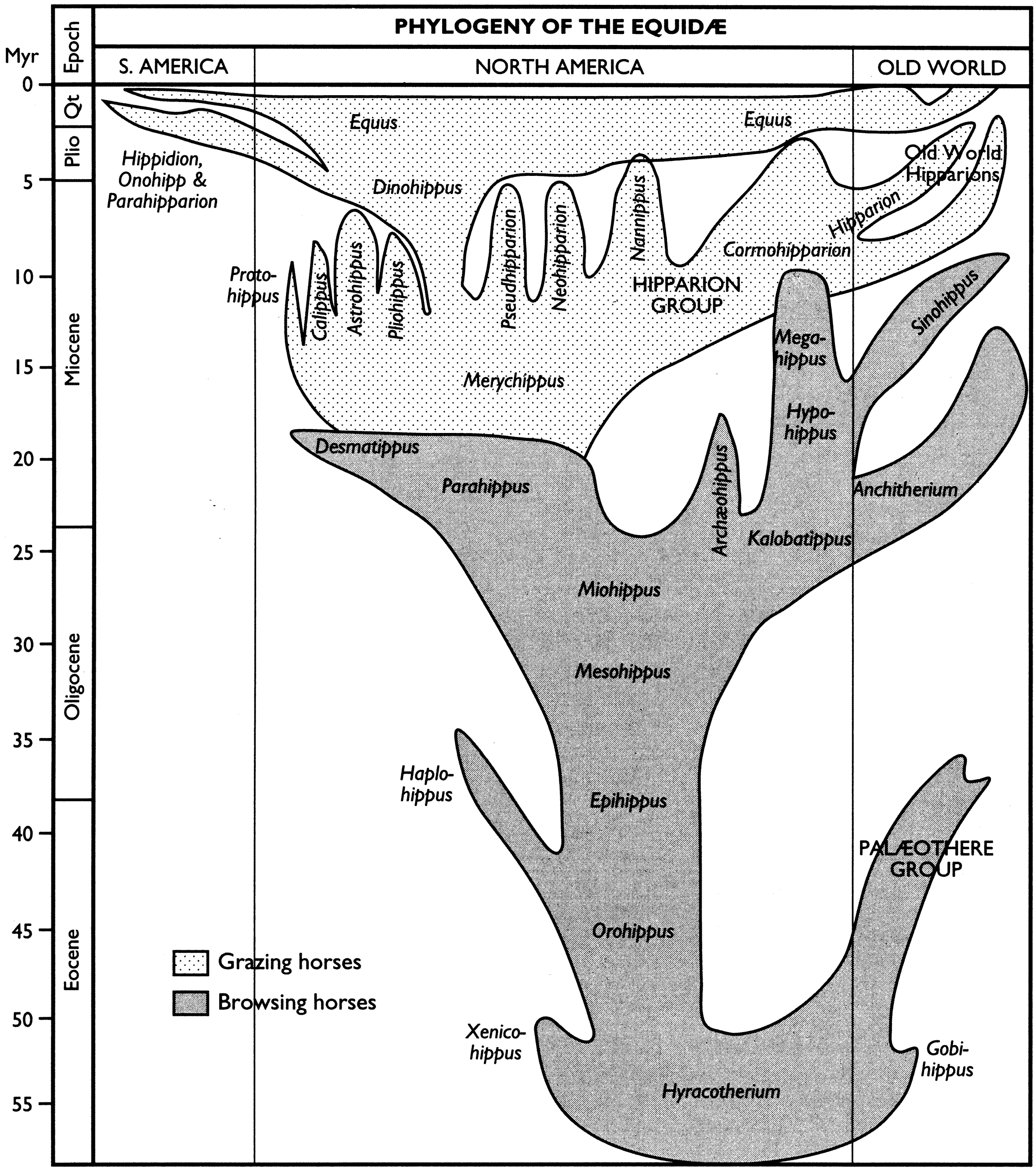


Figure 4: Interrelationships of the currently recognized genera of horses. After MacFadden (1992, p.99). Note that MacFadden's diagram also shows Hyracotherium *giving rise to the palaeotheres, another family of perissodactyls, as well as the horses. The placement of* Hyracotherium *at the base of the horse phylogeny is controversial among creationists, many of whom view* Hyracotherium *as having closer affinities with the modern-day hyrax (e.g. Gish, 1995, pp.195-197).*

brachyodont, and crown heights increase from *Merychippus* to *Equus*. However, textbooks make these trends look much more gradual and unidirectional than they really are in the fossil record. As Gould (1997, p.61) has pointed out, *Equus* is the only living genus of horses and therefore the only modern animal that can serve as an endpoint for a series. This is in contrast to the multiplicity of contemporaneous genera and species revealed by the fossil record:

'The evolutionary bush of horses includes many terminal tips, and each leads back to *Hyracotherium* through a labyrinth of branching events. No route to *Hyracotherium* is straight, and none of the numerous labyrinthine paths has any special claim to centrality ... We run a steamroller right over a fascinatingly complex terrain when we follow the iconographic convention for displaying the pathway from *Hyracotherium* to *Equus* as a straight line' (Gould, 1997, p.63).

The straight-line, progressive change attributed to horses is therefore an artifact of their impoverished modern diversity. Furthermore, this phenomenon is not unique to horses:

> 'Many classic "trends" of evolution are stories of such unsuccessful groups—trees pruned to single twigs, then falsely viewed as culminations rather than lingering vestiges of former robustness' (Gould 1997 p.64).

The increase in body size is one of the most striking features apparent in popular presentations of the horse sequence. However, MacFadden (1992, pp.216–222) provides an insight into the real complexities of the data. The increase in size between *Hyracotherium* and *Equus* was by no means gradual, constant, or progressive. An analysis by MacFadden (1987) of 24 ancestral–descendant species pairs revealed that 19 showed body-size increases. However, the remaining 5 lineages showed size decreases. There are even lineages within the horse family tree that show size decreases followed by reversals back to increased size (MacFadden, 1984; Webb and Hulbert, 1986; Hulbert, 1988).

To drive home this point, Gould (1997, pp.70–71) raises the question of how we would view the fossil record of horses if the genus *Nannippus* had survived to the present-day instead of *Equus*. Bearing in mind the geographic distribution and longevity of *Nannippus*, Gould considers its survival a plausible, though unrealized, contingency. *Nannippus* was a dwarf horse, no higher than a Shetland pony and considerably more gracile. It was not much bigger than *Hyracotherium*, so there would be no evident progression towards increased body size. *Nannippus* even had three toes on each foot, so the tale about loss of side toes would also lose most of its force. In fact, according to Gould, 'if *Nannippus* had survived and *Equus* died, we wouldn't be telling any famous story about horses at all' (p.71).

MacFadden (1992, pp.216, 223) is obviously right to issue the following caution:

> 'Since the turn of the century, most of the foremost paleontologists involved in original research on fossil horses (*e.g.* Matthew, Stirton, and Simpson) have recognized that the gradual, progressive trends depicted for fossil Equidæ are at best oversimplifications to illustrate general evolutionary patterns. The problem in the interpretation of these occurs when other scientists and the lay public, themselves far removed from the original data, seize the simplified essence of these general patterns, and consequently many of the details get lost in this process...Trends and directionality, though firmly entrenched in the literature and thought to be prime concepts within evolutionary theory, are, at best, broad patterns or generalizations.'

The real picture is more accurately portrayed in Figure 4, and even this oversimplifies the situation. This diagram shows the equid family tree constructed by Bruce MacFadden, the foremost modern authority on fossil horses (MacFadden, 1992, p.99). Gould's comment on this diagram is that it represents 'only copious branching bushiness, and nothing that anyone could identify as a central thrust amid the diversity' (1997 p.65). Even the earlier 'tolerably linear' part of the diagram is in reality a complex branching bush (Gould, 1997, pp.67–69).

The fossil record of the horse as a stratomorphic series

Much of the debate between creationists and evolutionists about the fossil record centres around the existence, or otherwise, of 'transitional forms.' In view of the interpretive and ambiguous nature of the term 'transitional form,' Kurt Wise has proposed a new vocabulary which I believe is a helpful one (Wise, 1995). For more details and discussion, the reader is directed to Wise's paper on the subject. The three main new terms he has introduced are:

> *Stratigraphic intermediate fossil:* a fossil which lies stratigraphically between two other fossils or between the lowest stratigraphic representatives of two fossil groups.
>
> *Morphological intermediate fossil:* a fossil which is in some sense morphologically intermediate between two other fossils or between the shared characters of each of two other fossil groups. The type of morphological intermediacy (fully- versus partially-developed features, single versus multiple features, *etc.*) is not specified.
>
> *Stratomorphic intermediate fossil:* a fossil which is both a stratigraphic intermediate and a morphological intermediate between two other fossils or two other fossil groups.

Using these, one can derive other terms, such as *stratomorphic series.* A stratomorphic series is a sequence of species or higher taxa where each taxon is a stratomorphic intermediate between the taxa stratigraphically below and above it. Bearing in mind all its complexity, the fossil record of the horse is an excellent example of a stratomorphic series. The question is, what are creationists to make of it?

Creationist apologetics and the horse series

Faced with the horse series as evidence for evolution, some creationists have argued that the series is artificial and does not exist in reality. In one sense, as we have seen, that is correct. Popular presentations usually suggest a simple, gradual, and progressive straight-line of evolution from *Hyracotherium* to *Equus* that is not supported by the actual fossil data. The real pattern is much more complicated and bush-like than the textbook diagrams and museum exhibits suggest. Evolutionary scientists readily acknowledge that this is the case. Niles Eldredge, for instance, commenting on an exhibit of fossil horses in the Hall of Tertiary Mammals in the American Museum of Natural History, calls it 'a classic of paleontologic museology' (Eldredge, 1989, p.222). Futuyma (1995, p.90) says, 'The history of horses, then, is very complex, and not at all the steady progress from *Hyracotherium* to the modern horse

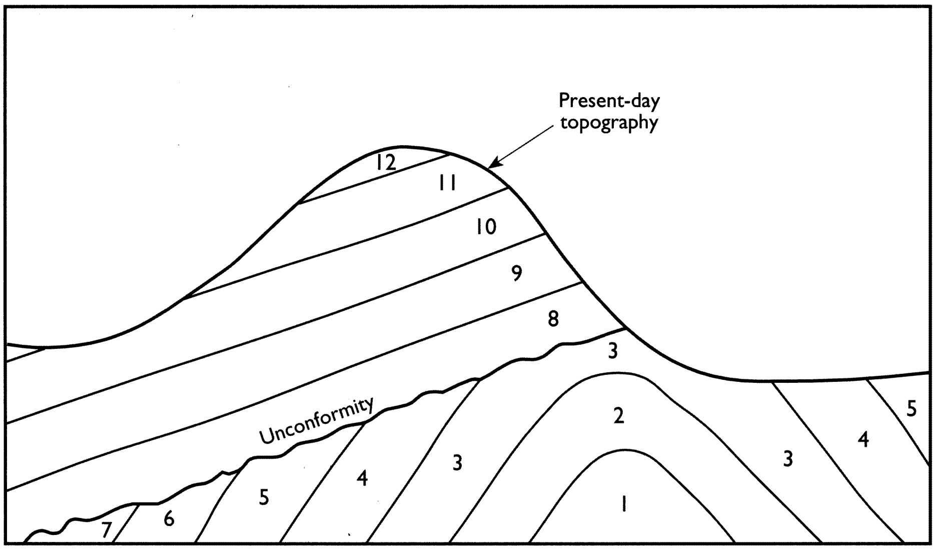


Figure 5: Layers of all ages may be exposed at the earth's surface.

Logic and common sense dictate that these sedimentary layers were laid down in sequence 1 to 12. After layer 7 was deposited, there was a period of uplift, folding and erosion to produce an unconformity. Subsequently layers 8 to 12 were laid down. Then further uplift and erosion exposed the layers as we see them here. Note that layers 3, 4, 5, 8, 9, 10, 11 and 12 are all exposed at the surface in this locality.

that is taught in introductory biology books.' None of this negates the series; it is merely that textbooks and museum displays are simplistic, portraying only selected trends. They do not reflect all the phylogenetic twists, turns, offshoots, and dead-ends that are evident in the fossil record.

However, I do not think that it is the complexity of the series that creationist authors have had in mind when they have argued that it is artificial. Take, for instance, this statement from Byron Nelson:

> 'The places in which they [*i.e.*, fossil horses] are found are widely scattered, hundreds of miles apart, and the strata in which the fossils are found are surface strata. One fossil is not found below the other in any sense of the word. For all geological evidence there is to the contrary all the animals mentioned may have lived and died at the same time. Yet names are given to the rocks in which the fossils are found suggesting different ages (Eocene, Oligocene, Miocene, Pliocene, Pleistocene, Recent), and the fossils themselves are arranged in a series from the smallest, *Eohippus*, a four-toed creature about the size of a fox, up to the largest, the modern single-toed horse, and people are told that this is the time order in which they lived, and that this is the line of ancestry of the horse' (Nelson, 1967, p.73).

In other words, Nelson argues that all the different types of fossil horses lived and died at the same time, and are not actually buried in succession in the fossil record. They have been artificially arranged into a succession by scientists with a preconceived bias about the evolution of the horse. This view denies that there is a genuine stratigraphic sequence, let alone a genuine stratomorphic sequence. Can such a view be sustained? Is the geological succession from Eocene to Recent really so arbitrary?

The fact that you cannot find a complete sequence of horse fossils one above the other in a single location does not disprove the sequence. At any one locality on the earth's surface only a small portion of the rock record is usually exposed, but geologists are able to reconstruct the complete sequence by using the well established principles of superposition, correlation, and the lateral tracing of rock layers into other areas (see Robinson, 1997, for more information on how the geological sequence is pieced together). Furthermore, folding, faulting and erosion lead to strata of all ages being exposed at the Earth's surface (Figure 5) so the fact that the different types of fossil horses are all found at the surface does not pose a problem or a contradiction to the sequence. Indeed, how else would palæontologists have been able to excavate, reconstruct, and study a fossil horse unless its skeletal remains had been exposed at the surface and were thus accessible to them?

Other creationists have argued that the series is artificial because there are genetic discontinuities between the animals included in it (*i.e.* the series is made up of animals some of which are completely unrelated to one another). Take, for instance, the view expressed by Frank Cousins:

> 'The family tree of the horse is beautiful and continuous only in the textbooks. In the reality provided by the results of research it is put together from three parts, of which only the last can be described as including horses...The construction of the whole Cenezoic *[sic]* family tree of the horse is therefore a very artificial one, since it is put together from non-equivalent parts, and cannot therefore be a continuous transformation series' (1971, p.83).

In his paper, Cousins argues that the three unrelated parts are as follows: (i) *Hyracotherium* and the other Eocene forms, (ii) *Mesohippus–Parahippus*, and (iii) all later forms. He considers that there are unbridged gaps between these three parts of the series and that only the last group consists of real horses. However, Cousin's analysis has been critiqued by Monroe (1985). Let us look at the reasons why Cousins divides the fossil equids as he does. The division between the Eocene forms and *Mesohippus* appears to have been made on the basis of size and numbers of toes on the forefeet:

> '*Epihippus* is the last of the old horses, while *Mesohippus* is the first of the new horses. Between these we have a very considerable jump. For the first horses were small animals, only as big as foxes, with four-toed forefeet; only with the latter did the large, three-toed type first occur' (p.79).

It is true that *Mesohippus* was typically a little larger than the earlier Eocene forms, but we should be careful not to exaggerate the difference, particularly when we take into account the range in size between species within the same genus. Perhaps the more important point is the number of toes on the forefeet. Most *Mesohippus* specimens have three-toed forefeet, in contrast to the four toes of the Eocene equids. However, Monroe points out that, although not widely known, at least two *Mesohippus* individuals from the early Oligocene of Wyoming have been found with four toes on the front feet (p.14). This means that the loss of the extra toe occurred after the transition to *Mesohippus*, and that the number of toes cannot be used to draw a distinction between the Eocene equids and *Mesohippus*.

The second discontinuity, according to Cousins, is between *Parahippus* and all later horses (such as *Merychippus*). He writes:

> 'Thereafter the real horse, the new horse, first appeared. The breaking of an hypothetical evolutionary series can hardly be more definite than with the appearance of this type. One-toedness dominated, although quite clear rudiments of two side-toes may occur. But an important deviant type occurred with respect to the teeth and the nature of the dentition. The teeth of the horse are very high, prismatic, not rooted (enamel-folded), and richly covered in cement. In this respect they are structures unique in the whole fauna. Animals with teeth first occur in the upper Miocene. These 'hypsodental *[sic]* ungulates' appear all at once, without intermediate states. They are even naturally variable, just like other groups, since they at once appeared in full bloom. With *Merychippus* and *Hipparion* there is a rich group of *Equus*-like forms which are all separated from the former 'brachyodontal' groups by a gaping evolutionary gap.' (p.82)

Cousins appears to have included *Merychippus* in the 'new horse' group because its dentition was more similar to those forms. However, as Monroe (p.14) points out, *Merychippus* was more like the 'old horses' in that it was three-toed. The explanation for horses like *Merychippus* that have a mixture of 'primitive' and 'advanced' traits is that the changes in toes and teeth were not proceeding at the same rate. Cousins' 'gaping evolutionary gap' between *Parahippus* and later horses is artificial. Even the trend towards hypsodonty began in *Parahippus*. Stirton (1940, p.178) comments that the earliest species of *Merychippus* and the latest species of *Parahippus* were 'hardly distinguishable.' Simpson (1953, p.104) draws attention to fossil populations that are 'perfectly intermediate between *Parahippus* and *Merychippus* and so varying in the "diagnostic" characters that assignment of individuals in a single population could be made to both genera and assignment of the population to one or the other is completely arbitrary.'

In summary, it is difficult to maintain the divisions made in Cousins' analysis of fossil horses.

Other critics have pointed to the co-existence of different horse genera in the same sediments as evidence against the idea that these forms might be associated in any kind of ancestor–descendant relationship. For instance:

> 'In the Rattlesnake Formation of the John Day Country of northeastern Oregon, the three-toed *Neohipparion* is found with the one-toed horse, *Pliohippus*. No transitional forms between the two are found. In other cases "primitive" species of a genus, such as those of *Merychippus*, are found in geological formations supposedly younger than those containing "advanced" species' (Gish, 1995, p.193).

Gish (p.194) goes on to quote from MacFadden (1992, p.255) about the discovery of an 'exquisitely preserved' population of *Dinohippus* from Ashfall Fossil Beds in northeastern Nebraska in which some individuals were three-toed and others were one-toed, and also MacFadden's statement (pp.257–8) that in the mid to upper Miocene we find three co-existing groups of fossil horses with 'diverse postcranial morphologies': those with a 'primitive' three-toed foot, those with an 'advanced' three-toed foot, and those with just one toe. His conclusion is that the three-toed forms did not evolve into the one-toed forms, but that they were unrelated types living at the same time. However, is this conclusion really warranted? Does not the fact that within a population of *Dinohippus*—in other words, within a single genus—we have both one-toed and three-toed forms, surely imply that these forms are genetically related? Furthermore, it does not logically follow that because three-toed and one-toed forms overlap in time, one did not give rise to the other. We do not conclude from the fact that a mother's lifespan overlaps with that of her offspring that she cannot be their mother. Similarly, there is nothing to prevent an ancestral population overlapping in time with a descendant population. What about the claim that no transitional forms exist between the three-toed and one-toed forms? If one gave rise to the other, would we not expect to find fossil evidence of the transition? That would depend on the nature of the transition. If, as I suggest later, the transition was accomplished by differential gene expression (*i.e.* the genetic information for side toes being switched off), then no transitional forms showing gradual reduction of side toes would be expected.

Another creationist author argues for separate ancestry of *Hyracotherium*, *Orohippus* and *Pliohippus* based on the different numbers of rib pairs in these species. *Hyracotherium* has 18 pairs, *Orohippus* has 15 pairs, *Pliohippus* has up to 19 pairs, and *Equus scotti* has 18 pairs. He concludes, 'The rib count denies any continuous evolution here' (Hiebert, 1979, p.61). However, as Monroe (1985, p.16) points out, in mammals ribs are found on the thoracic vertebræ, and the number of thoracic vertebræ, and hence the number of ribs, varies. Within a single species the rib count is usually consistent, but this is not always the case. Modern horses may have 17, 18 or 19 pairs of ribs (Epstein, 1971, p.422). Even in human beings, the number of rib pairs can vary (Pick and Howden, 1977, p.128). Hence, on the basis of rib counts it is erroneous to draw the conclusion that the fossil genera mentioned could not have been genetically related.

An alternative creationist approach

The horse series must be considered in its broader geological context. It is one of several impressive mammalian stratomorphic series that have been documented in the Cenozoic, including camels, elephants, rhinoceroses, and titanotheres (Carroll, 1988). It is surely significant, as Wise (1994, p.163) has pointed out, that almost all the stratomorphic series in the fossil record are found in the Cenozoic (with some, such as the mammal-like reptiles, in the Mesozoic). How the believer in a global Flood interprets these series will depend on the particular Flood model he or she adopts (Tyler, 1997). If the traditional Whitcomb-Morris approach is taken, with the Flood ending very late in the Cenozoic, all these series need to be explained in terms of Flood-related events. Anti-creationist Kenneth Miller lampooned this approach in the following words:

> '... the illusion of an evolutionary series was created by a differential sorting action which accompanied the flood. More bluntly put, *Equus* (the modern horse) tread water for a longer time than *Mesohyppus [sic]* (an intermediate form), and *Hyracotherium*, a small ancestral form, was a poorer swimmer still. Therefore, they have been buried in the imaginary "sequence" from which we now dig them up. This incredible mechanism must account not merely for the horse series, but for every evolutionary sequence known!' (Miller, 1982, p.87).

Without doubt this is a ridiculous caricature of the Whitcomb-Morris position, but there is an important point to be made here. How can we account for the formation of a plethora of well-documented vertebrate stratomorphic series during the Flood? No detailed explanation has yet been developed by advocates of the Whitcomb-Morris model. Other creationists place the Flood/post-Flood boundary lower in the stratigraphic record. Those who favour an end-Cretaceous boundary are able to interpret the Cenozoic mammal successions as genuine phylogenies but must explain the Mesozoic reptile successions in terms of Flood depositional processes, whereas those who favour an end-Carboniferous (or even lower) boundary are free to interpret the Mesozoic and Cenozoic vertebrate successions as genuine phylogenies.

In my view, fossil horses form a convincing within-family stratomorphic series, and one that is probably post-Flood. I agree with those creationists who have concluded that the series represents a real phylogenetic sequence (*e.g.* Wise, 1995). If this is the case, what were the natural selective pressures driving the diversification that we can trace in the fossil record? Whether the Flood/post-Flood boundary is at the end of the Cretaceous or earlier in the geological record, the explanation in terms of selective pressures is likely to be similar. I mentioned earlier that the horse series must be viewed in context as one of several Cenozoic stratomorphic series among the mammals. Wise (1995, p.220) has pointed out that almost all of these involve similar morphological changes that reflect a drying and cooling continental climate, along with evidence from the fossil flora of a transition from woodland to grassland communities. For instance, there is a trend from browsing to grazing and increased hypsodonty in the herbivores, and a move from woodland to open land among the primates (Wise, 1994, p.163). Creationists are able to explain the woodland–grassland change as a result of the drying and cooling of the post-Flood earth. Heat from subterranean sources and from cooling of new oceanic lithosphere during and after the Flood would have contributed to the accumulation of heat by the early post-Flood oceans. As the oceans cooled—a trend confirmed by oxygen isotope data from Cenozoic foraminifera (Vardiman 1996)—so would the continents, and the floral and faunal communities would be expected to reflect this. The trend towards increased body size may also reflect global cooling (Stanley, 1973). Wise (1995, p.221) comments that:

> 'Conventional theory has no explanation for the secular decrease in ocean temperature over this period, nor for the increase in grassland over this period (except for the *ad hoc* suggestion that the grasses must have evolved). Then conventional theory must suggest that high selection pressures caused parallel and convergent evolution to occur within a number of groups. Given the absence of a mechanism for the cooling and drying of the earth and the difficulty in independent creation of new genetic material in a number of groups, conventional theory is much less successful at explaining some of their favourite fossil evidence (namely the horse series) than is the creation model.'

How might the morphological changes documented in the horse series have come about in a creationist scenario? Creationism is often portrayed as a belief in biological fixity, which in a sense it is at higher taxonomic levels. However, at lower taxonomic levels the creationist who believes in a recent global Flood must account for large amounts of morphological change in a very short time scale. Are there biological mechanisms that would allow for rapid change? This question is addressed in some detail by Leonard Brand, and his new book is recommended reading for anyone interested in pursuing this subject further (Brand, 1997). A major part of a creationist biological theory is that organisms were originally created with latent (*i.e.* phenotypically unexpressed) genetic information that gave them tremendous potential for within-kind diversification. One way in which this latent genetic potential is regulated is by differential gene expression. By this we mean that in living organisms there are mechanisms by which genes can be turned on (*i.e.* expressed) or turned off (*i.e.* not expressed). Brand asks, '... could horses have a regulatory "switch" that determines whether their legs develop with one prominent toe with its single hoof, or whether three toes develop approximately equally? If so, and if other regulatory genes control size, teeth morphology, *etc.*, then the evolution of horses may have been a fairly simple genetic process' (p.202).

Indeed, there is evidence for differential gene expression in modern horses. McGowan (1984, p.147) describes the work of Ewart (1894), who studied horse embryos and found that at an early stage of development tiny limb buds appeared beneath the splint bones. When he dissected these buds to determine their internal structure he found that they resembled toes, with caps at the end that he believed represented hooves. At the most advanced stage it was even possible to distinguish three individual elements in the buds, corresponding to the three bones in the side toes of *Merychippus*. After this, and prior to birth, the limb buds were lost. It appears that modern horses retain the genetic potential for extra toes, but that regulatory genes switch off the structural genes for side toes during embryological development. Occasionally, something goes awry with this regulatory mechanism and foals are born with side toes (*e.g.* Marsh, 1879, 1892; Struthers, 1893). Evidently, even small changes in regulatory genes can produce relatively large phenotypic effects. It is likely that the splint bones of modern horses are true vestigial structures (*i.e.* they testify to real morphological changes in history). That splint bones are vestigial is no less true because they can be shown to serve a valuable function today (Bergman and Howe, 1990; Murris, 1992). In modern evolutionary theory an organ does not need to be functionless to be considered vestigial. Its form or function may simply be reduced or altered in some way (Brand, 1997 p.152).

Suggestions for future research

The creationist scenario I have outlined above is a starting point, not an end point. It suggests a host of possible research projects for creationist biologists. Based on current evidence, I have tentatively assumed that the boundary of the biblical 'kind' or baramin is at the family level in equids. However, confirmation of this awaits application of the methods of discontinuity systematics (ReMine, 1990) or baraminology (Wise, 1990) to the horse family. An issue that needs further discussion is whether *Hyracotherium* should be included in the equid baramin. Does *Hyracotherium* belong at the base of the horse phylogeny, any more than at the base of the phylogenies of the brontotheres, the rhinoceroses, the tapirs, or the chalicotheres? More research on the mechanisms that led to rapid post-Flood speciation within the horses and other Cenozoic mammals is needed. Which morphological changes depended upon regulatory genes acting on latent genetic information? What role did environmental stimuli play? What was the time scale over which the changes took place? There are many unanswered questions. If able creationists take up the challenge of answering them, it will give the lie to our opponents' claim that creationism stifles genuine research and it will be another clear demonstration that it is possible to be a good scientist and a creationist.

Conclusion

Palæontological and embryological data indicate that the horse series is a genuine phylogeny, but it does not constitute an example of megaevolution since the morphological change documented is within the taxonomic rank of family. It is possible for creationists to interpret this morphological change as within-kind diversification after the Flood. Since the magnitude and type of change represented by the horse series can be accommodated by both evolutionist and creationist models it cannot, therefore, distinguish between them. At best, in terms of the origins debate, the horse series is neutral data.

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AUTHOR

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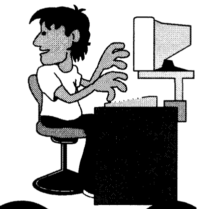

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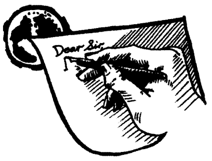

Graham Fisher

I read with interest the article by Richard H. Johnston entitled 'The Biblical Ages of the Patriarchs,' in *Origins* 24. He makes out an excellent case for a succession of catastrophic events which affected the life-spans of the patriarchs every three generations or so. The implication being that the Flood was only the first, and greatest, such event and that others not only affected the longevity of those days but also must have left an imprint on the geological record. He concludes that 'as the last reduction in life expectancy took place some 900 years after Noah's Flood, the period of significant geological upheaval following Noah's Flood may therefore have been very much longer, and on a greater scale, than has been normally assumed by creationists hitherto.'

As long ago as 1985 I maintained a similar position and was advocating a scenario of astro-catastrophism which could explain this phenomenon. In our then journal, *Biblical Creation*, volume 19 (Spring 1985) I authored an article entitled 'Creationism Needs Catastrophism.' This arose from the material in my book, *Speak Through the Earthquake, Wind And Fire*, (Countywise, 1982),' in which I outlined a catastrophic scenario based upon a concept of near astral collisions with the Earth by small cometary bodies or planetoids. This involved cyclical catastrophism as these 'bodies' locked into Earth orbit on eccentric, elliptical orbits affecting the surface of the Earth at periodic, regular intervals. I followed this up in 1992 at the Fifth European Creationist Conference, UK, held at High Leigh with a paper entitled 'A Possible Flood, Ice-Age and Earth Division Mechanism' which the Creation Science Movement kindly turned into a pamphlet (Number 288).

In the early 1980s most creationists were seeking to explain almost all geological phenomena by the one event of Noah's Flood. That this could not be so seemed obvious to me .... [The catastrophic] way we will be able to suggest mechanisms for the events we believe occurred, such as Johnston's declining longevity happening in step form after three generations of stasis. It will also help with the interpretation of the post-Flood geological phenomena which we want to incorporate into our Creation model of Earth history.

[*Editorial note:* Mr. Fisher mentions that his book, referred to above, is now out of print, but he could let members have a copy for £3 including postage and package. Send to him direct at 64 Grenville Road, Southcourt, Aylesbury, Bucks. HP21 8EZ].

Richard Johnston replies ...

Thanks for sending me Mr. Fisher's letter. In writing my paper I was, of course, only concerned with the biblical evidence and I left completely open the question of what scientific implications it might lead to.

Personally, I do have sympathy with Mr. Fisher's suggestions, at least as being *possibilities* about what may have occurred, but the real difficulty is in finding adequate facts to convert these possibilities into something more certain and substantial. You will notice that Mr. Fisher's idea does seem to be gaining a bit more interest generally in the Creationist literature—you will have seen D. A. Faulkner's article on comets in the *Creation Ex Nihilo Technical Journal*, 1997, 11 (3):264f.

Looking at the question scientifically, I consider that it is clear (from, for example, the scale of the Tertiary deposits and the overwhelming of many large land animals in them) that the Tertiary mountain building occurred violently and extremely rapidly, and that the Ice Age was associated with this mountain building or immediately followed it. The energy involved, and the rate of its production, if purely geological, is very large. The big question is whether this was a purely geological event (*i.e.* caused by forces generated within the Earth alone), or whether an astronomical event was the precipitating cause. In favour of the latter is that the two major Tertiary mountain belts, *(a)* Alpine-Himalayan and *(b)* North and South America, both lie on great circles. However, this might be purely coincidental and the events be just the result of the shapes of the relevant plates. Likewise, a cometary source for the Ice Age has some appeal, the alternative mechanism being the heat generated in the Tertiary mountain building. I am not sure that at the present state of knowledge we can decide. Perhaps we never will be able to.

Randall Hardy *(Manchester)*

The correspondence (*Origins*, 1997, (23):33–34) arising from John Peet's recent series on *The Bible and Chronology* requires some re-examination. Of course, there will always be differences of view concerning the interpretation of Scripture passages relating to distant historical events, because the reasons for them being written in the exact form they take cannot always now be determined. This is a fundamental hermeneutical problem.

I have detail difficulties with some views expressed in the correspondence, but I will not deal with them here. What concerns me *far more* is the general *attitude* which is expressed by those who wrote in, which is amply summed up by John Peet's closing paragraph: 'By way of summary, this correspondence indicates that, even with a high view of the inerrancy of Scripture, there is room for doubt on precise dates.'

The correspondents generally seem over-anxious to reassure *themselves* that such doubt exists and that the timescale is significantly longer than would be indicated by the obvious reading of Scripture. 'The lady doth protest too much, me thinks' (*Hamlet* III ii (242)). We must therefore ask '*Why* do many creationists want to extend the timescale like this?'

Each person must answer for themselves, of course, and I would not wish to put words into anyone else's mouth. I am, however, drawn to wonder if this desire is not very much akin to that which causes others to seek to tamper with the historical reliability of the entire creation account. I am sure I need not relate the lengths to which some people have gone to explain why Genesis and the many other passages which refer to creation *should not* be understood at face value. Perhaps the most well known of all 'gap' theories—the 'Gap Theory'—arose from the late nineteenth century desire to reconcile the contemporary secular perception of the geological record with the biblical one. Creationists now regard this theory as unacceptable accommodation with secular thinking. But it was once popular because *many Bible-believing Christians wanted to harmonise science with the Bible.* Since the accepted perception of science did not seem to fit the tight timescale of Scripture, Scripture must therefore have at least one very significant gap.

I am concerned by the desire of many to modify the biblical record. If we are honest, the reasons have nothing to do with Scripture, but everything to do with our desire to make our understanding of Scripture and our understanding of science and history fit together. Nothing in the Scriptures themselves demands that we adjust the data they provide us. This is not to deny that some genealogies recorded in Scripture are given incompletely, but in such cases the Bible provides the full list elsewhere, and sometimes the reason for the omission. Genealogy was obsessionally important in the ancient world—and perhaps especially to the Hebrews, hence Paul's admonition to Christians not to be obsessed with it (1 Timothy 1:4)! Hence it is contrary to sound hermeneutics to attribute gaps in those genealogies where sufficient age information is given from which a calendar may be derived, as it is from Creation to the Exodus. If such genealogies were incomplete, providing the information was pointless. (The record of the Septuagint should not be cited as argument against the older text. The evidence indicates that the translators chose to adjust the ages of the Patriarchs—probably to accommodate the popular world view of their day, which demanded longer timescales. Their folly is revealed by dating which has Methuselah surviving the Flood by 14 years!)

Increasingly, Christians are realising that it is possible to interpret geological data in a way that does not conflict with the biblical record nor deny what is observed in the field. Secular geologists too are recognising the weakness in theories which require extremely slow processes in rock formation. Less and less do we need to fear geology as the Achilles' heel of creationism—so perhaps for some Christians the focus of concern has now shifted to archæology. However, Egyptian chronology is fraught with difficulties, and views differ widely. The views of David Rohl, and of Steven Robinson, are each highly individual, and are almost as inconsistent with each other as they are with the views of most secular and some Christian Egyptologists. No current theory fits the biblical account of Middle Eastern history adequately, though some may seem to do so superficially. There are other people who are working on approaches to archæology that are consistent with the biblical accounts and time-scales. For the present though, we *must accept* that we cannot yet say why archæology and the Bible accounts do not match.

The desire to avoid needing to admit that we do not have an answer in this area may explain why some appear very anxious to accommodate the biblical account to secular thinking. To my dismay I am increasingly convinced that many evangelicals are not as confident as they say they are about the Scriptures. From my childhood I have had a growing confidence in the Lord which has carried over into a security about the truth of the biblical record. I believe I have never lost my early simple approach to the Bible: if things had happened differently then He would have told us so (as stated by Jesus—John 14:2). This is, in my understanding, an important aspect of the perspicuity of Scripture. For many years I lived under the illusion that *all* Bible-believing Christians had a similar confidence in the Lord and that the creation or evolution debate was only to be argued out with non-Christians. The discovery that many who confessed the authority of the Scriptures did not actually have a practical confidence in them, dawned upon me slowly, but forcibly! Sadly, in harmony with this double-mindedness, 'theistic evolution' dominates the thinking of Christian leadership in this country.

Am I in the process of a second rude awakening? Naïvely, I had assumed that the majority of creationists accepted that human history has been as long as the Scriptures indicate. I accept that Ussher's calculations are neither inspired nor entirely reliable, but others (*e.g.* Martin Anstey (1913), *Romance of Bible Chronology*) provide useful calculations and more accurate reasoning in support of a similarly fundamentalist view of biblical chronology. We may differ on precise dates, but to appeal to significant numbers of missing generations in order to align with secular thought is a very slippery slope! We also need to recognise the scale of the readjustment some people are suggesting. Biblical dating gives a period of approximately 100 years from the death of Methuselah and the start of the Flood to the birth of Peleg, the most probable period for Babel. Yet Steven Robinson, for example, suggests that this period needs to be extended to about 450 years. When there is no *biblical* reason to doubt what has been written, experience as well as conviction tells me that I must stay with the plain reading of the Scriptures. It is more honest to say we do not know, than to try to force Scripture to fit our present understanding of science or history. God has spoken: He does not need our help to steady the Ark (2 Samuel 6:6–7), but we must carry it His way, and not slavishly copy the methodology of the world.

Robert I. Bradshaw

Following correspondence from Mr. Geoffrey Lewis about my article 'The Interpretation of Nature and the Bible' in *Origins* 23, I would like to draw your attention to some amendments, please. In the Table 1, first item, the entry under Calvin should read 'No (human).' The fourth item seems to draw an unnecessary distinction between Calvin and Morris and would probably be best omitted.

The fifth item on who walked with Adam and Eve in the garden contains an incorrect page reference to Morris' work; it should be p.116. In item 7, it would probably remove any ambiguity if I added to Calvin's reference pages 335–336.

I thank Geoffrey Lewis for his feedback.

Graham Wilson

I write to express my appreciation for Michael Garton's helpful article about dinosaurs.... To suggest that Matthew 24:27 relates to our own future challenges the clear statement of the Lord Jesus. He specifically warned His disciples that all these things would happen in their time and generation and He also confirmed it (v. 34,35). In fact, it was the Jewish age (not ours) which was soon to close when the Lord would come in severest judgment against the unrepentant nation of Israel. This calamity was prophesied in the Old Testament and was actually fulfilled at AD 67–70, *i.e.* within a generation.

[*Editorial comment:* We are not going to open up an area of debate on prophecy and its interpretation: that would be beyond the brief of the Society. This letter is included in fairness to the writer.]

F. H. Pullan

I express gratitude for all the years of pleasure *Origins* has given myself. The format has improved radically and become very professional. I take this opportunity to thank you all and express my continued allegiance to your Aims.

Dr. Jon Reuben *(Nottingham)*

For the past year, I have been musing on the origin of dogs and the relationship of this to the evolution/creation debate.

First, I examined the position of the dingo. During my veterinary training, I had been taught that this was probably a

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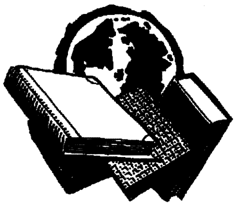
Reviews



Science as Salvation—a modern myth and its meaning, by Mary Midgley. Routledge. 1992. 250 pp.

Reviewed by Frank J. Peachey

BEG, borrow or buy a copy of this book—derived from the 1990 Gifford Lectures—for its readability, clarity of thought and downright commonsense. Mary Midgley was formerly senior lecturer in philosophy at the University of Newcastle.

Each of the book's 19 chapters is subdivided into short sections with eye-catching titles such as: Megafacts and metaphysics; Spam in cans; Reason as disinfectant; and Green varnish! With characteristically incisive and vivid language, Mrs. Midgley deals with what she regards as the excessive claims that scientists and others have made about the scope and capacity of science as a whole. The author explains her use of the word 'salvation' in the title by saying that science has come to be seen as providing answers to questions previously thought to be the prerogative of religion. Science appears to promise immortality by means of advanced technology according to the strange fantasies produced by some cosmologists, *e.g.* Barrow and Tipler. There are also discussions of how some other scientists regard the roles of purpose and chance.

The doctrine of scientism—with the implied belief in the omnicompetence of science—has been steadily gaining ground in our culture throughout this century, due largely to the success of technology. The author says that her book '... is about myth-making as a vital human function.' Science, or more correctly scientism, seems to have replaced religion in fulfilling this function. For many people today, science is seen as having a special kind of value to which we all owe allegiance. Many people believe that science has in some sense 'disproved' religion. 'An extremely odd idea,' says Midgley. 'It is as if science and religion were competing for the same job.' Science can clash with religion if science is in the business of providing the faith by which people live; but faith is (she says) a basic trust, the acceptance of a map, a perspective, principles of organization.

She is unhappy with Paul Davies' assertion that science offers a surer path to God than religion. 'Anyone who based their metaphysical or religious position, their attitude to life, on a particular interpretation of quantum mechanics or the latest CERN discovery, would be likely to need a new one every two years.'

Scientists such as J. D. Bernal and J. B. S. Haldane were attracted to Marxism as an atheistic and 'scientific' alternative to Christianity. Thus science was to provide salvation without the unwelcome competition from God. The only serious rival to Marxism was evolutionism (about which Mary Midgley has written elsewhere).

On *purpose*—or teleology—Midgley writes that our mind's connexion between order and planning and design, our conception of order in the Universe is a crucial background to our thought. This is not some irrelevant superstitious survival, as some writers claim. There are, today, renewed offers of explanation of purpose, *e.g.* Richard Dawkins: 'We no longer have to resort to superstition when faced with the deep problems; is there a meaning to life? What are we for? What is man?' *('The Selfish Gene')*. And, according to Stephen Hawking, we may be on the verge of a complete description of the Universe, which will enable us to 'know the mind of God.' That we need to think teleologically is unfashionable today. Attributing meaning to orderly phenomena is extremely modest and mild, claims Mary Midgley, and is not equivalent to the argument from design. However, C. S. Lewis is quoted with apparent approval: '... we are not reading rationality into an irrational universe but responding to a rationality with which the universe has always been saturated.' To which Midgley adds: 'Throw purpose out through the door, and it seems to creep in up the drains and through the central heating' !

She attacks those scientists whom she says have drawn vast and gratifying conclusions about cosmic matters from very slender theoretic arguments, *e.g.* Barrow and Tipler in 'The Anthropic Cosmological Principle.' Their ideas involve the 'promotion of human minds to the honour of retrospectively creating the cosmos.' It is the elevation of the human mind—*the apotheosis of man*—that Midgley objects to. They claim that the future destiny of the human race is to colonize the universe. When the 'omega point' is reached, '... we will have gained control of all matter and form,' and thus the human race will have achieved immortality in the form of machine descendants (glorified computers). 'There apparently speak two people who have never known a car break down' says Midgley. Traditional religious symbolism is thus used in a quite contrary way, offering salvation via a miraculous technical fix.

Arguing against *reductionism*, Midgley exposes the *folie de grandeur* of George Wald's claim: 'A physicist is an atom's way of knowing about atoms.' She asks: 'Why should physics be supreme? We ought to know by now that the universe has no single secret. All studies are complementary and need each other.' She is not happy with the idea that everything outside physics is irrational. 'Religion is admittedly subjective, non-rational, and privatized *but* it might be a unifying structural proposal.' It was the deeply religious faith of Faraday and Clerk Maxwell that actually helped them in forming theories. The author makes some vitally important points about the quest for objectivity or impartiality: 'The scientist cannot abstain from moral choices or metaphysical assumptions.' Total neutrality is impossible. 'The cleft between feeling and reason ... is a disastrous error.'

She poses a very pertinent and challenging question: 'Why should a suspicious, disbelieving temper be held to be, simply in itself, so much more morally respectable than a hospitable, believing one?' She has some pungent criticisms of Peter Atkins' book *The Creation*, declaring it to be almost completely lacking in real explanation; an essay in extreme reductionism and militant rationalism, with a bias towards dogmatic denial. According to Atkins, at the Creation: 'The structureless dust of points grew into the order we now recognise as space–time … it emerged by chance out of its own dust … this universe survived by chance because it was the fittest.' Mary Midgley comments: 'What sense is there in this Just So story when there was nothing else in existence for this universe to fit with? And the meaning of 'chance' in this context must remain uncertain.' Chance can only come into play within an existing orderly context. In the Atkins' scenario, chance or chaos is treated as a positive guiding force, in place of God. Monod's ideas (in *Chance and Necessity*) are also attacked as existentialist rhetoric. She also rejects Freeman Dyson's notion of a consciousness pervading all matter—a world-soul. Dyson is one of the 'space colonizers.'

Creationists are dismissed by Midgley in a few, rather harsh words: 'Only the most naïve of fundamentalist theologians treats the instantaneous creation of the world as philosophically important.' But isn't she perhaps naïve when she expresses surprise that creationists today do not show any interest in a flat earth? Her attitude to the biblical creation account may be deduced from what she has written elsewhere: '… recent debates about the creation [reveal] an extraordinary confusion between literal and symbolic meaning' (*New Scientist*, 1 August 1992). Once the physical world is deemed not to be independently real, writes Midgley, background entities such as God or the world-soul are needed to supply the order and continuity that is so essential for all our thought, especially for science. This seems to imply that belief in a real independent physical world is incompatible with belief in God as independent Creator. She accepts the orthodox evolutionary idea that humans are late-comers on the earth, but her insight into the problems of neo-Darwinism is revealed by a comment about the fragility of organisms: 'the scope for [adaption] is very limited and most of them fail.'

The Ice Man. A recent discovery that has shattered the theories of scientists and supported the Bible, by Ian Brown. Ambassador Productions Limited, Belfast. 1993. 62pp.

Reviewed by Paul Garner

THIS little book uses the discovery of the Tyrolean Ice Man to develop an evangelistic message. On 19 September 1991, two German hikers stumbled upon a Neolithic corpse that had been preserved in the Similaun glacier on the Austrian–Italian border. It became known as the Ice Man and the find received wide coverage in the media at the time. The reason for the flurry of media attention was, to a large degree, because of the remarkable sophistication of this Neolithic man. Despite the great radiocarbon age of the find (up to 5,300 B.P. according to some estimates), this individual was far from primitive. Here was a Neolithic corpse associated with surprisingly modern clothes, and equipped with unexpectedly sophisticated tools and hunting implements. Anthropologists, used to thinking in evolutionary terms, view the history of mankind as a gradual development from ape-like ancestors living several millions of years ago (Tyler, 1989). They were unable to hide their surprise at the advanced level of Neolithic culture revealed by the Ice Man. On a BBC 'Horizon' programme transmitted 27 April 1992, Dr. Lawrence Barfield of the Department of Archæology at Birmingham University said, 'It seems almost that this find has been designer-made to embarrass the prehistorians.'

Ian Brown does a good job of explaining in simple terms how the discovery of the Ice Man challenges contemporary thinking on the origin and development of man. He shows that the biblical account, in which mankind possesses highly advanced intellectual and technological skills from the very beginning, receives strong support from this find. The author also addresses the question of how the Ice Man fits into the flow of biblical history. His approach is solidly young-earth creationist, although some fellow young-earth creationists—myself included—would not agree with the author on all particulars of his favoured model (*e.g.*, the vapour canopy theory mentioned on pages 24–26). Where I substantially part company with the author is in his strong implication that the Ice Man, along with the mammoths of Siberia, were entombed during the Flood (pp.23–31). He acknowledges that the Ice Man may date to the post-Flood period (p.31), but the preceding discussion indicates that he tends to the view that the Ice Man was a direct victim of the Flood. For instance, he suggests that the Ice Man may have been climbing the Alpine mountains to escape the rising Flood waters (p.30). I do not believe that this is a tenable position. The morphological traits of the Ice Man, in conjunction with the circumstances surrounding his burial, indicate that he was a post-Flood individual, possibly born during the recessional phase of the Pleistocene Ice Age (Beasley, 1994). The Alps are a post-Flood mountain range (Garton, 1997). As for the mammoths of Siberia, most creationists would agree with Oard (1990, pp.87–88) that they were post-Flood animals. They are buried in surficial permafrost that sits atop the fossil-bearing sedimentary rock layers, and must therefore post-date them (Garton, 1990, p.7).

The book closes with an appeal to the reader to consider the uncertainty of life. Just as the Ice Man had unfinished business—the task of preparing his bow and arrows was not completed—so we do not know when our lives may unexpectedly be snatched from us. The author presents us

The Ice Man

with solemn warnings from the Scripture, urging us to make our peace with God. We can join with the author in praying that some may be caused to think on eternal things as a result of reading this short book.

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Faith, Reason, and Earth History. A Paradigm of Earth and Biological Origins by Intelligent Design, by Leonard Brand. Andrews University Press, 213 Information Services Building, Berrien Springs, Michigan 49104–1700, USA. 1997. 332pp. ISBN 1–883925–15–0. $34.99.

Reviewed by Paul Garner

SO few books present a scientifically credible view of earth history from a young-age creationist perspective that this addition to the list is extremely welcome. The author is associated with the Geoscience Research Institute at Loma Linda University in California, and is on the editorial board of the institute's journal (and our namesake), *Origins.* He has a Ph.D. from Cornell University, and is the author of several published papers in the peer-reviewed literature of biology and palæontology.

This book is important in a number of ways. It presents a closely argued case for a paradigm that the author calls 'informed intervention.' This term is Brand's preferred alternative to the more popular 'creationism.' As he explains in the preface, 'informed intervention' is more inclusive, recognising God's intervention in Creation, the Flood, and the Scriptures, while avoiding some of the negative connotations that 'creationism' has acquired (pp.viii–ix). In the first six chapters, Brand examines scientific methodology and the relationship between faith and science. He argues persuasively that it is not necessary to be a philosophical naturalist to be a good, careful, and productive scientist. He helpfully distinguishes between hypotheses that fall within the remit of science (those that are testable by the criteria of our five senses) and hypotheses that are non-scientific (those that are non-testable by these criteria). Both naturalistic evolution and interventionism have testable and non-testable aspects, and Brand gives examples (pp.69–71). He shows that it is not only possible to practice science within the interventionist paradigm, but that interventionism can actually stimulate—and not stifle—research. All of this is very helpful as we think about our response to those who claim that one cannot be a creationist and a scientist (*e.g.* Pine, 1984).

In the remainder of the book, Brand applies this scientific philosophy to the data of geological and biological science, and develops an interventionist understanding of earth history. Along the way, we are shown those areas about which interventionists and naturalistic evolutionists can agree and those about which there is disagreement. Some readers may be surprised by the extent of the common ground. For instance, the processes of microevolution (change within a species), speciation (the production of new species), and even some macroevolution (at least up to new genera) can be accepted by both biblical creationists and naturalistic evolutionists (pp.111–126). It is megaevolution, the production of new families and any taxonomic group above the level of family, with which creationists have their real dispute. Brand also shows how interventionists and naturalistic evolutionists can agree on many aspects of geological study. We can agree on processes, though perhaps not always on rates, of rock formation (p.215). We can use the same principles in interpreting depositional environments, though interventionists should be more aware of the limitations of modern analogues (pp.218–226). We can agree that there is a genuine sequence of rocks and fossils that is reflected in the standard geological column (pp.236–240), though we will have very different opinions about the time scale that it represents (pp.245–266).

One noteworthy aspect of this book is that it attempts to build a credible creationist alternative to naturalistic evolution, while taking seriously the scientific challenges posed by evolutionary theory. Evolutionists are never ridiculed or belittled by the author. In fact, in chapter nine, Brand places himself in the position of arguing the case in favour of megaevolution. He actually does a pretty good job, and I think that evolutionists reading this will agree that he is very fair in presenting their case on their behalf. Another pitfall that Brand works hard to avoid is the elevation of creationist scientific theories to the level of Scripture:

> 'Humans tend to have pet theories about the details beyond what the Bible says; and when those theories are questioned, they assume others are attacking the Bible. Obviously, the Bible does not say anything about Paleozoic rocks or Mesozoic reptiles. We can't equate our specific theories about such things with Bible truth.' (p.43)

With this in mind, I must confess to being somewhat disappointed that Brand did not interact a little more with alternative creationist views of earth history. The model that Brand presents is one in which the Cambrian to Cretaceous portion of the geological record was laid down in the Flood, with the Cenozoic representing the post-Flood period (although he recognises that some creationists prefer a model in which the Flood ends very late in the Cenozoic). The stratigraphic distribution of the pre-Cenozoic fossils is explained primarily by pre-Flood ecological zonation. His is the best defence of such a Flood model that I have yet seen in print. However, nowhere does Brand mention or discuss creationist models in which the Flood ends earlier than the Cretaceous. In his discussion of fossil vertebrate tracks (pp.291–292), for instance, he could have cited Garton (1996) for an alternative viewpoint, but he does not do so. One possible source of bias is that there appear to be few references to the creationist literature besides publications of the Geoscience Research Institute. Another criticism I have concerns Brand's comments that floating forests were deposited to form the Carboniferous coal seams (p.288). He appears to have attributed this idea to the wrong person. The floating forest model originated with Joachim Scheven, not Steven Austin. As I understand it, Scheven was the first modern-day creationist to argue that the Carboniferous coals formed from a now extinct pre-Flood *marine* ecosystem; in Austin's model the Palæozoic coals represent *terrestrial* vegetation that was ripped from the land during the Flood. The two concepts are different.

Perhaps I am being a little unfair about Brand's lack of discussion of competing creationist models. Brand is simply offering us his preferred model of earth history. He is not expecting us to agree with him on every aspect, or even most aspects, of his model. Indeed, he offers the following salutary caution to the reader:

> 'It is somewhat dangerous to publish information like this because some may give it more authority than it deserves. George McCready Price published books on creationism and geology several decades ago, and there are people today who react to challenges to his writings as if the Bible itself were being challenged. A book, and particularly this one, should not be used to get 'the answers'; it should be read as one person's thinking on the topic at this time.' (p.ix)

We may have serious disagreements with Brand's model in some areas. Nevertheless, the spirit and tone in which the author writes is praiseworthy. This book will generate light, not heat, in a debate that badly needs more of the former and less of the latter! It sets a standard for others to emulate. It deserves the widest possible readership among creationists and evolutionists alike, and will help each to understand the other much better.

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Understanding the Present—Science and the Soul of Modern Man, by Bryan Appleyard. Picador. 1992. 283 pp. £14.

Reviewed by Frank J. Peachey

THIS is a user-friendly product with Notes, Index, Bibliography and a Glossary. It has a lot in common with Midgley's book, sharing many of the same targets but Bryan Appleyard delivers hefty broadsides compared to the rapier-like thrusts of Midgley. He deals with some wider aspects of what he sees as the baneful influence of science on our way of life, *e.g.* health fads.

'Modern scientific attitudes reduce us all to a condition of blank, adolescent nihilism ... [they have] made us unable to sustain or defend the very heart of our culture.' Writing about the absence of an authoritative basis for morality, Bryan Appleyard says that scientific liberalism 'diminishes the value of the individual; my life has no meaning.' He almost echoes Francis Schaeffer's 'man becomes a zero' in *How Should We Then Live?*

He exposes the shallowness of our generation, with the tendency to ignore history. We must understand the past in order to understand the present, which is why Appleyard traces the history and development of science and philosophy over the last 400 years, as does Schaeffer. Mankind lost its place in the Universe via Newton, Galileo, and then in the mid–19th century Charles Darwin showed that 'we were accidents of deep time and blind evolution.' Then 'with Freud, our expulsion from Eden was completed, we were exiled from the workings of our own minds.' As technology improved, science seemed to be so flamboyantly good that it must be right, it must be 'The Truth.' We were left alone with whatever values we could construct in the privacy of our own heads. 'A dog,' said Darwin bleakly, 'might as well speculate on the mind of Newton ... Let each man hope and believe what he can.' The scientific world-view has deprived us of an external anchor for our values.

Appleyard says that Christianity is unique. He sees that monotheism implies the unification of knowledge: 'One God means a single underlying pattern': surely a *sine qua non* for creationists! Bryan Appleyard asserts that 'Science contradicts religion—absolutely.' Of course this depends upon his definition of science. Has science moved into the spiritual vacuum left by the abandonment of religion, for which science is responsible? This reviewer believes that the real culprit is not science *per se* but dogmatic scientism.

Liberal theology, he says, has removed much of the content and historical reality from traditional Christianity, but Kierkegaard's 'leap of faith' is mentioned with apparent approval. Environmentalism—the Green ideology—is seen by Bryan Appleyard as a quasi-religion which he rightly considers inadequate. 'The success of science precipitated a religious crisis; physical evidence for religion was stripped away by successive generations of scientists ... faith will continue to be eroded by science ... science now answers questions as if it were a religion. Despite all this, he declares that traditional religion cannot be shown to be untrue! 'A reason to live cannot be invented ... we cannot think our way to purpose and meaning,' he writes. Nevertheless Bryan Appleyard seems to have a rather ambivalent attitude towards biblical Christianity.

Our author believes that science, starting with Hutton, has established a great age for the earth, millions upon millions of years of 'deep time.' Regarding Darwin and evolution, Appleyard makes the striking claim: 'Every serious attempt to discredit Darwinism founders before the apparently miraculous workings of deep time.' As if time itself was, miraculously, creative! And DNA research has, apparently, confirmed our kinship with all living things. Bryan Appleyard also says that Darwinism can be tested by observation of the living world. If only he had added that such observation shows up the flaws in macro-evolution! Although he makes no direct reference to creationists perhaps we are included in his 'little pockets of resistance.'

Dealing briefly with modern developments in science, *viz.* relativity, quantum theory and chaos theory, Bryan Appleyard says these have transformed the idea of scientific truth. '20th century science has become progressively more weird since Max Planck arrived at the idea of the quantum.'

'Hard science is now quite clearly in the business of answering *why* questions rather than restricting itself to *how* questions.' He also mentions the anthropic principle, and the 'soft science' of Fritjof Capra who links modern sub-atomic physics with Eastern religion (Taoism) which Bryan Appleyard dismisses as 'wishful thinking.' He quite rightly points out the danger of deriving values and meaning from scientific theories, which are subject to change. 'How meaningful is it to derive ... a new form of personal salvation from the distant reaches of mathematics and experimental physics?'

Bryan Appleyard censures Stephen Hawking and Paul Davies for what he thinks is their arrogance. The reductionism of 'hard' scientists such as Richard Dawkins and Peter Atkins is discussed , and Bryan Appleyard quotes from the latter's book *The Creation*: 'There is nothing that cannot be understood ... nothing that cannot be explained; everything is extraordinarily simple.' So Atkins, at least, is bent on removing any idea of anything mysterious or ultimately incomprehensible in the Universe.

Science is now said to be on the brink of discovering a 'Theory of Everything.' This means that science is invading the final stronghold of philosophy and faith. Can a machine possessed of a self-consciousness similar to our own be created? Some scientists believe this is possible. Others take the view that the self will always remain beyond science. Some believe it is God-given and lies beyond human reason. There are, according to some mathematicians (*e.g.* Penrose),logical reasons why such a conscious machine or super-computer cannot be created. Bryan Appleyard thinks it is 'beyond argument that science has had a devastating effect on the human sense of self and purpose ... science is incapable of telling us anything about the self,' he says boldly, referring to 'attributes such as self-consciousness that have occurred because of the blind statistics of deep time, by-products of evolutionary complexity.'

What Appleyard objects to so strongly is the notion that science is the only agreed final truth of our age. Scientists 'are asking for our faith in their subjective certainty of their own objectivity!'

The answer to all this (he writes) is *not* anti-scientific but does involve the humbling of science and the ridiculing of some of its more absurd and incoherent rhetoric. He has made an excellent start in pointing out the holes in the rotten fabric of modern scientism. What a pity he cannot see that the evolutionist Emperor's new clothes are non-existent! 'Science needs to be returned to its proper place as a small part of our total culture.'

'It is pointless trying to find God in the quantum or chaos theories as it was to find him in the Newtonian cosmos. Nothing about our lived experience ever corresponded to Newton's laws of motion and nothing in Hawking's equations will ever resemble what our natures demand of the mind of God. We know this to be true, but science has done terrible damage to our faith. It is time to start making repairs.'

Unfortunately Bryan Appleyard does not tell his readers where and how God can be found.

Continued from page 25

feral dog, brought as a domesticated dog to Australia when the Aborigines migrated there 12,000 years ago. I had problems with this as I was also taught that dogs were not domesticated until about 5,000 years ago. My recent research has turned up the following 'facts.'

Dingos were probably brought to Australia by boat traders from New Guinea between 3,000 and 8,000 years ago. The Aborigines appeared in Australia between 5,000 and 120,000 years ago, depending on whose story you follow. They arrived by land-bridge or canoe—again depending on which version you prefer. But evolutionists maintain that no other mammals got into Australia. Aborigines either take young dingo pups and rear them as domesticated dogs within their camps to help with hunting, or the dingos scavenge round the edge of the camp and occasionally join in hunting expeditions.

Whilst looking at the dingo, I discovered something even more perplexing from the evolutionary point of view. The Falkland Island wolf became extinct in the 18th century, shortly after the islands became inhabited. (It is actually more closely related to the fox). The Falkland Islands are 1,000 miles from the South American coast. There were no other mammalian species including man on the islands until they were discovered in the 16th century. The conclusion (from an evolutionary point of view) must be either that foxes evolved from reptiles independently and in parallel or that two foxes were extraordinarily good swimmers.

Further, the domestic dog *(Canis familiaris)*, the wolf *(Canis lupus)*, the coyote and the jackal are all designated as separate species. However, they all breed with fertile offspring and have the same number of chromosomes. Thus, they are all one species.

Finally, there are currently over 150 breeds of domestic dog—of all shapes and sizes with varying numbers of teeth in the upper and lower jaws. If these were graptolite or any other sort of fossil, they would have to be designated different species and presumably we would be told that the small breeds evolved into bigger or that the four teeth sometimes missing from the chihuahua's jaw were due to the chichuahua occupying a different ecological niche from the West Highland Terrier. Or that the rotation of the knee cap in the Yorkshire Terrier gave it some evolutionary advantage.

These are just some reflections which may be of anecdotal use in debate or lecture.

[*Editorial note:* There is obviously potential here for an article on the development of the canids from Creation or the Flood.]

Theory in Search of Reality?

Review Article by Colin Reeves

At Home in the Universe, by Stuart Kauffman. Penguin Books, 1995.

FOR many years, reductionism has been the dominant paradigm in science—the idea that we gain understanding of physical processes by reducing them to smaller and smaller sub-units. Questions of why a system behaves in a certain way are usually answered by showing how the behaviour can be explained in terms of what is happening to smaller parts of the system. Everything, in other words, is reduced ultimately to mechanism.

In fact, atheist writers like Richard Dawkins and Jacques Monod have argued strongly that a scientific understanding of the world precludes any concept of purpose or design. Chance and necessity (in Monod's famous phrase) explain everything. To Dawkins, what might appear to an uninformed person as the product of a design process is merely a 'designoid'—an artefact of genetic variation and natural selection, nothing more. The amazing order and complexity of our world can apparently be reduced to the product of a statistical process. However, while the man in the street may not have realized it (having only 'media science,' heavily dominated by such as Richard Dawkins, to rely upon), it does appear that cracks are starting to appear in the edifice of reductionist science.

The reductionist approach has undeniably been successful in all sorts of contexts, but nevertheless, for many scientists there is always the sneaking feeling that this approach cannot be the whole truth. From a Christian perspective, this feeling is not surprising: we do not believe that God's creation is a clockwork universe that runs 'on its own.' We also realize that it is a struggle for human beings to keep suppressing the truth of a God who, as Paul argues

> 'ever since the creation of the world ... has been clearly perceived in the things that have been made' (Romans 1:18–23).

Thus the biologist Christian de Duve, a Nobel laureate, has written

> 'Life is either a reproducible, almost common-place manifestation of matter ... or a miracle. Too many steps are involved to allow for something in between' (de Duve, 1995).

The reductionist approach has perhaps nowhere been more influential than in the theory of evolution by natural selection, yet Brian Goodwin, professor of biology at the Open University, has written in several places of what he sees as the inability of natural selection to provide an explanation for

> 'the large-scale aspects of evolution, *including the origin of species*' (Goodwin, 1994). [my italics]

In recent years, this sense of unease, this feeling that the whole is more than the sum of its parts, has found expression in what some are (rather grandly) calling the new science of complexity. A good survey of some of these ideas and their applications can be found in Coveney and Highfield (1995). Artificial intelligence, artificial life, neural nets, fuzzy systems, evolutionary computation—these are some of the 'buzz words' that are frequently found, not only in serious conference papers and journal articles, but also in popular science writing (*New Scientist, Scientific American, etc.*) and in books that try to explain to a wider public what it is that scientists are doing. Apart from the books mentioned above, other influential examples are those by Levy (1993) and Kosko (1994).

While de Duve posits a miracle as one explanation for life in the quote above, it is for him merely a rhetorical device. Likewise, Goodwin does not wish to break with naturalistic science. But if they are correct—and increasingly it appears their views are gaining credence—then an alternative is urgently needed. It is here that complexity theory has a role to play.

One of the most prominent and able scientists associated with the science of complexity is Stuart Kauffman of the Santa Fe Institute in New Mexico. His particular concern is with the impact of the concepts of complexity on the standard neo-Darwinian concepts of evolutionary theory. His first book (Kauffman, 1993) dealt with some of these issues for a scientific audience. His new book—*At Home in the Universe*—covers some of the same ground, but for a more general audience, and it has received enthusiastic reviews in the popular scientific press. Its title reflects the fact that he has become to believe that life is not some cosmic accident, so that we are aliens in a hostile universe, but that life is rather to be expected. The universe is such that it was inevitable that we should come to be.

From the creationist perspective, there are some very satisfying sections where Kauffman effectively shoots holes in Dawkinsian arguments for the efficacy of gradualist natural selection. (Not that his arguments are new—creationists have often made similar points—but it is helpful to see them given greater prominence.) However, Kauffman remains committed to evolution. In his view the problem with evolution is that natural selection has been asked to do too much. Evolution needs an extra ingredient, which he believes is the idea of self-organization.

Kauffman begins by confronting modern man's sense of alienation, of being merely a cosmic accident in an environment that is totally indifferent to our presence—in the telling phrase which gives him his title, we are not 'at home' in the universe. His first chapter puts this into perspective by means of a rapid tour through Copernicus, Newton and Darwin, the second law of thermodynamics, non-equilibrium systems, chaos theory and the algorithmic theory of computation. The reader is likely to be pretty breathless by the end, but he uses these diverse examples to express repeatedly the idea that there is some mysterious property of self-organization that is possessed collectively by groups of atoms, cells, chemicals or whatever. This concept is what complexity theorists call an emergent property of a system—roughly that the whole is greater than the sum of its parts. In a phrase that becomes an oft-heard refrain throughout the book, Kauffman argues that we find 'order for free.'

The rest of the book is devoted to explaining how this concept might account for the development of order in different systems, ranging from autocatalytic networks of molecules, gene regulation, ecosystems and avalanching sand-piles to complex economic and social systems. He does this primarily by developing computer simulation models, whose properties are then investigated.

His *N-K* Boolean networks are perhaps the best example: suppose we have a network of light bulbs (*N* of them, where *N* is a large number), each of which is connected by complicated circuitry to exactly *K* others (*K* is another number, much smaller than *N*). The circuits all have rules which determine whether a bulb is 'on' or 'off' depending on the state of its neighbours (those to which it is connected). What happens if we switch a few bulbs on externally? The rules will dictate that some light up while others switch off. It turns out that for small values of *K*, a fixed pattern of lighted and unlighted bulbs quickly materializes, but for larger values a chaotic system emerges with bulbs flashing on and off apparently at random. The transition between these two types of behaviour is very sharp (*i.e.* it occurs over a very narrow range of values for *K*—perhaps just from *K*=2 to *K*=3, for example), and Kauffman speculates that it is on this boundary (the 'edge of chaos') that systems will develop the ability to maintain stability and yet retain flexibility—one of the characteristic features of living systems. It is, therefore, his belief that by studying these computer simulation models, we may be able to learn something that will help us understand complex natural processes.

Much time is subsequently spent in discussing the idea of 'autocatalytic networks.' Kauffman speculates that the *N-K* Boolean networks are like complex chemical reactions: the 'lights bulbs' are chemical compounds, the 'rules' are catalytic reactions between groups of compounds. If one puts something in to start the whole thing off, a sort of chain reaction will develop, leading to the synthesis of a vast range of different chemicals. The whole process, at least if the analogy is correct, is highly dependent on some key parameters—too small, and the process fails to get anywhere, too large, and the process becomes completely unstable. This is the 'edge of chaos' idea again.

This metaphor turns up again in his discussion of cells. Cells need to be stable, otherwise the results for living organisms could be disastrous. Yet novelty (*i.e.* 'evolution') cannot arise under such conditions, so could it be that, provided they are close to the boundary of stability, or edge of chaos, groups of cells will contain sufficient diversity that *collectively* they can rapidly produce new 'species'? If so, we can expect the process to be self-limiting, since increased competition will drive the system back towards the stability boundary again. However, there is a fundamental problem—Kauffman fails completely to relate the models to the actual systems he is discussing. All his molecules have names like A, B and C, or Q, R and S—but this is not just the scientist's shorthand for molecules with names a yard long, rather it seems to cover up the fact that we know of no real molecules to which this can be related. In Kauffman's world, all is metaphor. Now of course metaphors are useful, but there needs to be a clear demonstration that what is in the picture bears some relation to reality. It is this that, at least for the moment, is lacking.

There is an intriguing contrast to make here. As Tyler (1997) has recently pointed out, one of the problems with mediæval theology was the way it became divorced from the real world and focussed on thought experiments framed in terms of the prevailing Aristotelian world-view. Here we have modern scientists doing essentially the same thing! Kauffman's thought experiments are modernized by the use of the computer, but in our current state of knowledge that is really all they are.

Perhaps the models for which Kauffman is most widely known are his *N-K* landscapes, which have been influential in fields outside biology, such as the mathematics of optimization. His 'patches' technique (described in chapter 11) has proved successful in finding optimal solutions to real-world problems. These models and their behaviour are indeed rather interesting to people (such as this reviewer) whose research work is in the area of optimization and artificial intelligence.

They also have something interesting to say regarding evolution. He uses the metaphor of a landscape to describe the evolution of biological populations by means of recombination, mutation and natural selection. Yet, as his models show, the landscape has to be finely tuned for these processes to produce increasing order and complexity. There are limits to what selection can do: on the one hand, if the landscapes are too rugged, evolution is trapped; if they are too smooth, populations suffer random drift, and selection has no fitness information to guide it. As Kauffman comments,

> 'Either we are very, very lucky ..., or there was something that adjusted the knob.'

Kauffman's solution to this conundrum is of course to invoke some mysterious principle of self-organisation to do what natural selection cannot accomplish on its own.[1]

The last chapter relates to social and economic systems. The principles he has enunciated in a biological context are applied to economics and culture. It is perhaps here that most readers will feel his ideas have some resonance with their own everyday experience. Most of the effects of this are technologically driven, and Kauffman ruefully laments the way we have lost our awe and respect for nature. He quotes one of his colleagues on the need to 'reinvent the sense of the sacred,' and in one sense, that is what Kauffman is trying to do.

Viewed as a whole, there is an intriguing message that seems to permeate the book. It is clear that for most of the systems he discusses, some very stringent conditions have to be satisfied. Things have to be 'just right,' else either nothing would happen at all, or the result would be complete disorder and chaos. Although Kauffman does not state it in these terms, one wonders whether what he is articulating is the idea of an 'anthropic principle' of biology, in line with the ideas of the cosmologists.

Some parts of this book are rather heavier going than they need to be, and it is not free of mistakes. Several times—on pages 121,124 and 167, for instance, he *divides* by a probability when he means to *multiply*. Some of the figures are poorly, or even incorrectly labelled—figures 8.4a and 8.4b, for example. And he makes a statement about the mean size of 'extinction avalanches' on p.236 that is statistically incomprehensible. One suspects that some of this is due to over-simplification for a non-specialist audience. On the whole, I think he succeeds, although personally I could have done with more equations to make some points clearer. However, I suspect that is a distinctly minority taste!

Nevertheless, there are many good reasons to read this book, quite apart from the fact that it is in any case both interesting and rewarding to read. If, as many are starting to believe, the neo-Darwinian star is waning and a paradigm shift is in the making, naturalistic science will need something with which to replace or perhaps, (for Kauffman) to supplement it. Complexity, self-organization, emergent phenomena—these seem like the best ideas in town at the moment, and a lot of scientific effort is going into their exploration, particularly at Santa Fe. It therefore makes sense for Christians to increase their awareness of these concepts. Kauffman's book provides a readable, stimulating and thought-provoking account of the ideas current at one of the world's most original institutions.

Notes

1. Incidentally, some interesting and more recent work, also carried out at Santa Fe, has thrown this problem into even sharper relief. This so-called 'No-Free-Lunch' Theorem (Wolpert and Macready, 1995) states that on the average, no one search algorithm—that is, in this case, no process for evolving populations—is any better than any other. So why, if the Darwinian hypothesis is true and this metaphor is relevant, should biological 'landscapes' be suited to the 'algorithm' of natural selection?

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